

# Proračun razine vodostaja u otvorenom spremniku u ovisnosti o vremenu i dužini preljevnog praga

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**SVEUČILIŠTE U SPLITU**  
**FAKULTET GRAĐEVINARSTVA, ARHITEKTURE I**  
**GEODEZIJE**

# **ZAVRŠNI RAD**

**Lara Rogošić**

**Split, rujan 2020.**

**SVEUČILIŠTE U SPLITU**  
**FAKULTET GRAĐEVINARSTVA, ARHITEKTURE I GEODEZIJE**

**Proračun razine vodostaja u otvorenom spremniku u  
ovisnosti o vremenu i dužini preljevnog praga**

**Završni rad**

**SVEUČILIŠTE U SPLITU**

**FAKULTET GRAĐEVINARSTVA, ARHITEKTURE I GEODEZIJE**

Split, Matice hrvatske 15

**STUDIJ:                   PREDDIPLOMSKI SVEUČILIŠNI STUDIJ  
                                  GRAĐEVINARSTVA**

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**KATEDRA:            Katedra za hidromehaniku i hidrauliku**

**PREDMET:            Hidromehanika**

### **ZADATAK ZA ZAVRŠNI RAD**

Tema: Proračun razine vodostaja u otvorenom spremniku u ovisnosti o vremenu i dužini preljevnog praga

Opis zadatka: Zadatak je potrebno riješiti numeričkom integracijom mješovitim postupkom te za tri varijante dužine preljevnog praga izračunati preljev viška vode iz spremnika. Potrebno je istražiti utjecaj vremenskog koraka na kvalitetu rješenja te sve rezultate prikazati grafički.

U Splitu, 21. svibnja 2020.

Voditelj Završnog rada: Doc. dr. sc. Davor Bojanić, dipl.ing.građ.

# Calculation of water level in open tank in dependency of time and overflow threshold length

## *Sažetak:*

Izvršen je proračun za promjenjiv vodostaj u spremniku, te preljev viška vode iz spremnika čija je površina ovisna o vodostaju. Voda istječe kroz kratku odvodnu cijev, a ostatak se prelijeva preko preljevniog praga. Proračun je riješen numeričkom integracijom mješovitim postupkom.

## *Ključne riječi:*

Protok, preljev, preljevni prag, numerička integracija, mješoviti postupak, otvoreni spremnik

## *Abstract:*

A calculation was made for the variable water level in the tank, and the overflow of excess water from the tank whose surface depends on the water level. The water flows out through a short drain pipe and the rest is poured over the overflow threshold. The calculation is performed by numerical integration by a mixed procedure.

## *Key words:*

Flow, overflow, overflow threshold, numerical integration, mixed procedure, open water tank

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# 1. ZADATAK ZA ZAVRŠNI RAD

**KOLEGIJ: Hidromehanika**

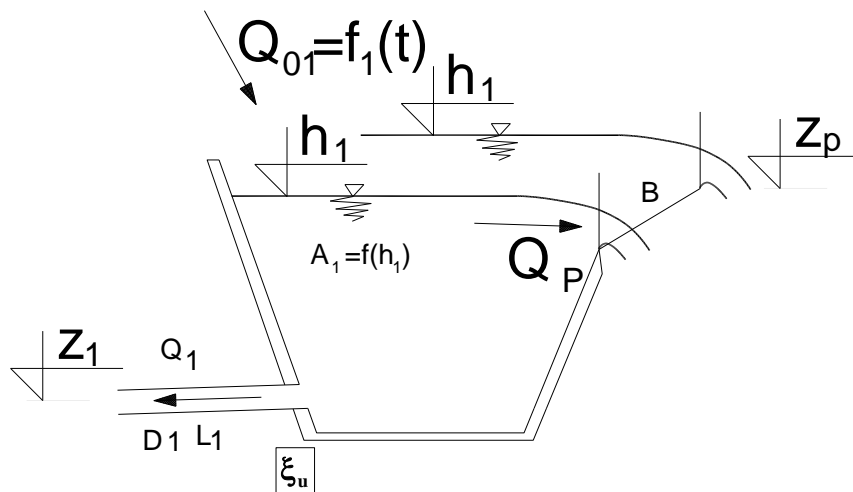
**KANDIDAT: Lara Rogošić**

Zadan je otvoreni spremnik čija je površina promjenjiva ovisno o vodostaju. U spremnik se ulijeva protok promjenjiv po vremenu. Iz spremnika istječe voda kroz zadanu kratku cijev. Na koti  $z_p$  postoji preljevni prag preko kojega se prelijeva višak vode iz spremnika.

Studentica će postaviti sve potrebne jednadžbe koje opisuju zadani problem. Zadatak će riješiti numeričkom integracijom mješovitim postupkom.

Zadatak treba riješiti za 3 varijante dužine preljevnog praga. Istražiti utjecaj veličine vremenskog koraka na kvalitetu rješenja.

Za rješavanje koristiti tablični kalkulator (EXCELL). Rezultate prikazati grafički.



Slika 1. Vodospremnik s preljevom i ispusnom cijevi

Zadano je:

Površina vodospremnika u funkciji nadmorske visine:

| h (m n.m.) | A (m <sup>2</sup> ) |
|------------|---------------------|
| 90         | 200                 |
| 100        | 250                 |
| 105        | 270                 |
| 110        | 300                 |

Dotok:

| t (s)    | Q <sub>0</sub> (m <sup>3</sup> /s) |
|----------|------------------------------------|
| 0,00     | 2,00                               |
| 200,00   | 3,00                               |
| 300,00   | 8,00                               |
| 500,00   | 7,00                               |
| 900,00   | 4,00                               |
| 1200,00  | 2,00                               |
| 10000,00 | 2,00                               |

$z_1=90$  (m n.m.)

$D_1=0.8$  (m)

$L_1=100.0$  (m)

$\varepsilon = 0.001$  (m)

$\nu = 0.00000131$  (m/s<sup>2</sup>)

$\xi_u = 0.5$

$B_1=2.0$  (m);  $B_2=4.0$  (m);  $B_3=6.0$  (m)

$z_p = 100$  (m n.m.),  $m = 0.4$

Početna razina vode u spremniku je 98.00 (m n.m.).



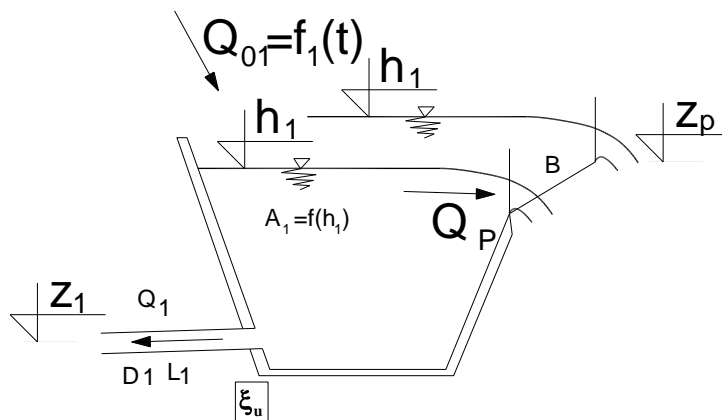
## 2. TEHNIČKI OPIS

### 2.1. Uvod

Projektom zadatkom zadan je otvoreni spremnik čija je površina promjenjiva ovisno o vodostaju. Iz spremnika voda istječe kroz kratku cijev, a ostatak vode se počinje prelijevati kada razina vode u vodostaju prijeđe visinu krune preljevnog praga. Na temelju zadanih podataka istražen je utjecaj veličine vremenskog koraka na kvalitetu rješenja za tri varijante dužine preljevnog praga.

Zadano je:

- Površina vodospremnika u funkciji nadmorske visine
- Dotok u funkciji vremena
- Početna razina vode u vodospremniku
- Visina preljevnog praga



Slika 1. Vodosprennik s preljevom i ispusnom cijevi

### 2.2. Geometrijske i hidrauličke karakteristike

Zadani sustav sastoji se od otvorenog spremnika s dotokom promjenjivim u vremenu, a na boku, pri dnu spremnika nalazi se početak kratke cijevi kroz koju istječe voda. Cijev je otvorena i iz nje voda istječe slobodno u atmosferu. Površina vodospremnika se mijenja u funkciji nadmorske visine. Na nadmorskoj visini  $h=90.0$  (m n.m.) površina vodospremnika iznosi  $A=200$  ( $m^2$ ), za  $h=100.0$  (m n.m.) površina iznosi  $A=250$  ( $m^2$ ), za  $h=105.0$  (m n.m.) površina iznosi  $A=270$  ( $m^2$ ) i za  $h=110.0$  (m n.m.) površina vodospremnika iznosi  $A=300$  ( $m^2$ ). Kruna preljevnog praga nalazi se na koti  $Z_p=100$  (m n.m.). Kratka cijev kroz koju istječe voda nalazi se na koti  $Z_1=90$  (m n.m.). Duljina cijevi iznosi  $L_1=100$  (m), a promjer cijevi jednak je  $D_1=0.8$  (m).

Za koeficijent lokalnog gubitka energije na ulazu uzeta je vrijednost  $\xi_u=0.5$ . Zadatkom je zadana apsolutna pogonska hidraulička hrapavost u iznosu od  $\varepsilon=0.001$  (m), pomoću koje se izračunavaju linijski gubitci energije. Također je zadana vrijednosti i kinematičkog koeficijenta viskoznosti tekućine  $\nu = 0.00000131$  ( $m/s^2$ ).

### 3. PRORAČUN

#### 3.1. Postupak proračuna

Početna razina vode u vodospremniku je 98.00 (m n.m.).

1. Jednadžba kontinuiteta za vodospremnik je:

$$A \cdot \frac{dh}{dt} = Q_0 - Q_1 - Q_p \quad (1)$$

Nakon separacije varijabli dobije se:

$$dh = \frac{Q_0 - Q_1 - Q_p}{A} \cdot dt \quad (2)$$

Numerička integracija mješovitim postupkom daje:

$$h^{k+1} = h^k + \frac{Q_0^k - Q_1^k - Q_p^k}{A^k} \cdot (1 - \vartheta) \cdot \Delta t + \frac{Q_0^{k+1} - Q_1^{k+1} - Q_p^{k+1}}{A^{k+1}} \cdot \vartheta \cdot \Delta t \quad (3)$$

Pri čemu je A površina spremnika,  $Q_0$  je dotok,  $Q_1$  je protok kroz odvodnu cijev, dok je  $Q_p$  protok preko preljevnog praga.

$h$  je vodostaj u vodospremniku.

Oznake  $h^k$ ,  $Q_0^k$ ,  $Q_1^k$ ,  $Q_p^k$  odnose se na vrijednosti na početku vremenskog intervala. Oznake  $h^{k+1}$ ,  $Q_0^{k+1}$ ,  $Q_1^{k+1}$ ,  $Q_p^{k+1}$  odnose se na vrijednosti na kraju vremenskog intervala. Vodostaj na kraju intervala odredit će se iz izraza (3).

2. Preljevni protok računa se prema sljedećem:

$$\text{ako je } h > z_p, \quad Q_p = m \cdot B \cdot \sqrt{2g} \cdot (h - z_p)^{3/2} \quad (4)$$

$$\text{ako je } h = z_p, \quad Q_p = 0.00 \quad (5)$$

$$\text{ako je } h < z_p, \quad Q_p = 0.00 \quad (6)$$

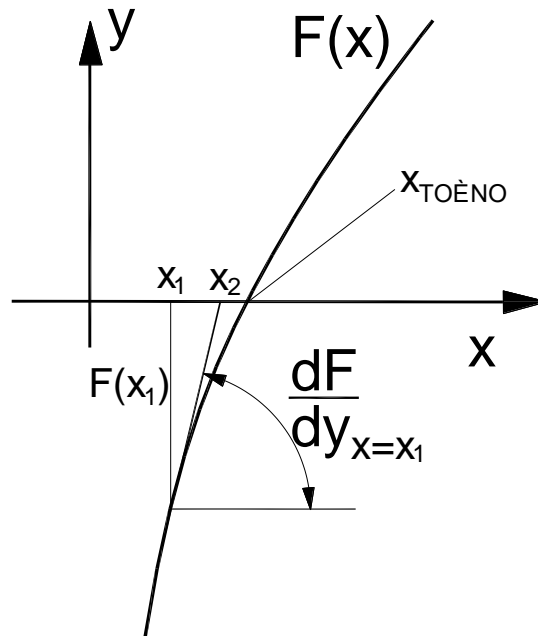
Ukoliko je vodostaj u spremniku jednak ili manji od kote preljevnog praga, onda je preljevni protok jednak nuli (5, 6), a ukoliko je vodostaj u spremniku veći od kote krune preljevnog praga, onda se preljevni protok računa po datoj izrazu (4).

3. Protok kroz cijev:

$$Q_1 = \frac{1}{\sqrt{\xi_u + \lambda \frac{L_1}{D_1} + \alpha}} \sqrt{2g \cdot (h - z_1)} \cdot D_1^2 \cdot \frac{\pi}{4} \quad (7)$$

Jednadžba (3) je nelinearna jednadžba s jednom nepoznanicom. Traži se  $h^{k+1}$ , tj. vodostaj na kraju vremenskog koraka.

Primjenjuje se Newtonova metoda za rješavanje nelinearnih jednadžbi.



Slika 2. Objašnjenje Newtonove metode

Neka je zadana funkcija  $F(x)$ . Tražimo onaj  $x$  ( $x_{\text{točno}}$ ) za kojeg vrijedi da je  $F(x)=0.0$ . Postupak je takav da se odabere vrijednost  $x_1$ . Za tu vrijednost  $x_1$  izračuna se vrijednost funkcije u toj točki  $F(x_1)$  i vrijednost derivacije u toj točki. Novu vrijednost za  $x$ , tj.  $x_2$  koja će biti bliže točnom rješenju dobit će se iz sljedećeg:

$$(x_2 - x_1) \cdot \frac{dF}{dy_{x=x_1}} = -F(x_1) \quad (8)$$

Oдавde slijedi:

$$x_2 = x_1 - \frac{F(x_1)}{\frac{dF}{dy_{x=x_1}}} \quad (9)$$

Time je određen postupak postupnog približavanja točnom rješenju.

**Formira se funkcija F. Ovdje je nezavisna varijabla vodostaj  $h^{k+1}$ .**

$$F = h^{k+1} - h^k - \frac{Q_0^k - Q_1^k - Q_p^k}{A^k} \cdot (1 - \vartheta) \cdot \Delta t - \frac{Q_0^{k+1} - Q_1^{k+1} - Q_p^{k+1}}{A^{k+1}} \cdot \vartheta \cdot \Delta t = 0 \quad (10)$$

$$Q_1^k = \frac{1}{\sqrt{\xi_u + \lambda^k \frac{L_1}{D_1} + \alpha}} \cdot \sqrt{2g \cdot (h^k - z_1)} \cdot D_1^2 \cdot \frac{\pi}{4} \quad (11)$$

$$Q_1^{k+1} = \frac{1}{\sqrt{\xi_u + \lambda^{k+1} \frac{L_1}{D_1} + \alpha}} \cdot \sqrt{2g \cdot (h^{k+1} - z_1)} \cdot D_1^2 \cdot \frac{\pi}{4} \quad (12)$$

$$\text{ako je } h^k > z_p, \quad Q_p^k = m \cdot B \cdot \sqrt{2g} \cdot (h^k - z_p)^{3/2} \quad (13)$$

$$\text{ako je } h^k = z_p, \quad Q_p^k = 0.00 \quad (14)$$

$$\text{ako je } h^k < z_p, \quad Q_p^k = 0.00 \quad (15)$$

$$\text{ako je } h^{k+1} > z_p, \quad Q_p^{k+1} = m \cdot B \cdot \sqrt{2g} \cdot (h^{k+1} - z_p)^{3/2} \quad (16)$$

$$\text{ako je } h^{k+1} = z_p, Q_p^{k+1} = 0.00 \quad (17)$$

$$\text{ako je } h^{k+1} < z_p, Q_p^{k+1} = 0.00 \quad (18)$$

Derivacija funkcije F po  $h^{k+1}$  je:

$$\frac{dF}{dh^{k+1}} = 1.0 + \frac{\vartheta \cdot \Delta t}{A^{k+1}} \cdot \left( \frac{dQ_1^{k+1}}{dh^{k+1}} + \frac{dQ_p^{k+1}}{dh^{k+1}} \right) \quad (19)$$

$$\frac{dQ_1^{k+1}}{dh^{k+1}} = \frac{1}{\sqrt{\xi_u + \lambda^{k+1} \cdot \frac{L_1}{D_1} + \alpha}} \sqrt{2g} \cdot D_1^2 \cdot \frac{\pi}{4} \cdot \frac{1}{2 \cdot \sqrt{(h^{k+1} - z_1)}} \quad (20)$$

$$\text{ako je } h^{k+1} > z_p, \frac{dQ_p^{k+1}}{dh^{k+1}} = m \cdot B \cdot \sqrt{2g} \cdot \frac{3}{2} \cdot (h^{k+1} - z_p)^{1/2} \quad (21)$$

$$\text{ako je } h^{k+1} = z_p, \frac{dQ_p^{k+1}}{dh^{k+1}} = 0.00 \quad (22)$$

$$\text{ako je } h^{k+1} < z_p, \frac{dQ_p^{k+1}}{dh^{k+1}} = 0.00 \quad (23)$$

$$h^{k+1, n} = h^{k+1} + \Delta h^{k+1} \quad (24)$$

$$h^{k+1, n} = h^{k+1} - \frac{F}{\frac{dF}{dh^{k+1}}} \quad (25)$$

Postupak se ponavlja sve dok prirast  $\left( \frac{-F}{\frac{dF}{dh^{k+1}}} \right)$  po apsolutnoj vrijednosti ne bude manji od zadane točnosti.

Kad se to postigne ide se na novi vremenski interval.

### 3.2. Rezultati proračuna

Rješavanjem numeričkom integracijom mješovitim postupkom dobiveni su sljedeći podaci koji prikazuju razinu vode u vodospremniku, dotok, protok kroz cijev i protok koji se preljeva preko preljevnog praga u ovisnosti o vremenu, za tri različite širine preljevnog praga.

Tablica 1. Dotok  $Q_0$ , protok  $Q_1$  i preljevni protok  $Q_p$  za dužinu preljevnog praga  $B=2$  (m) u ovisnosti o vremenu  $t$

| t (s) | h (m n.m.) | $Q_0$ (m <sup>3</sup> /s) | $Q_p$ (m <sup>3</sup> /s) | $Q_1$ (m <sup>3</sup> /s) |
|-------|------------|---------------------------|---------------------------|---------------------------|
| 0     | 98,000     | 2,000                     | 0,000                     | 3,073                     |
| 5     | 97,9780    | 2,025                     | 0,000                     | 3,068                     |
| 10    | 97,9565    | 2,050                     | 0,000                     | 3,064                     |
| 15    | 97,9357    | 2,075                     | 0,000                     | 3,060                     |
| 20    | 97,9154    | 2,100                     | 0,000                     | 3,056                     |
| 25    | 97,8957    | 2,125                     | 0,000                     | 3,053                     |
| 30    | 97,8767    | 2,150                     | 0,000                     | 3,049                     |
| 35    | 97,8582    | 2,175                     | 0,000                     | 3,045                     |
| 40    | 97,8403    | 2,200                     | 0,000                     | 3,042                     |
| 45    | 97,8230    | 2,225                     | 0,000                     | 3,038                     |
| 50    | 97,8063    | 2,250                     | 0,000                     | 3,035                     |
| 55    | 97,7901    | 2,275                     | 0,000                     | 3,032                     |
| 60    | 97,7746    | 2,300                     | 0,000                     | 3,029                     |
| 65    | 97,7596    | 2,325                     | 0,000                     | 3,026                     |
| 70    | 97,7452    | 2,350                     | 0,000                     | 3,023                     |
| 75    | 97,7314    | 2,375                     | 0,000                     | 3,021                     |
| 80    | 97,7182    | 2,400                     | 0,000                     | 3,018                     |
| 85    | 97,7055    | 2,425                     | 0,000                     | 3,015                     |
| 90    | 97,6934    | 2,450                     | 0,000                     | 3,013                     |
| 95    | 97,6819    | 2,475                     | 0,000                     | 3,011                     |
| 100   | 97,6710    | 2,500                     | 0,000                     | 3,009                     |
| 105   | 97,6606    | 2,525                     | 0,000                     | 3,007                     |
| 110   | 97,6507    | 2,550                     | 0,000                     | 3,005                     |
| 115   | 97,6415    | 2,575                     | 0,000                     | 3,003                     |
| 120   | 97,6328    | 2,600                     | 0,000                     | 3,001                     |
| 125   | 97,6246    | 2,625                     | 0,000                     | 3,000                     |
| 130   | 97,6170    | 2,650                     | 0,000                     | 2,998                     |
| 135   | 97,6100    | 2,675                     | 0,000                     | 2,997                     |
| 140   | 97,6035    | 2,700                     | 0,000                     | 2,995                     |
| 145   | 97,5976    | 2,725                     | 0,000                     | 2,994                     |
| 150   | 97,5922    | 2,750                     | 0,000                     | 2,993                     |
| 155   | 97,5874    | 2,775                     | 0,000                     | 2,992                     |
| 160   | 97,5831    | 2,800                     | 0,000                     | 2,991                     |
| 165   | 97,5793    | 2,825                     | 0,000                     | 2,991                     |
| 170   | 97,5761    | 2,850                     | 0,000                     | 2,990                     |
| 175   | 97,5734    | 2,875                     | 0,000                     | 2,990                     |
| 180   | 97,5713    | 2,900                     | 0,000                     | 2,989                     |
| 185   | 97,5697    | 2,925                     | 0,000                     | 2,989                     |
| 190   | 97,5686    | 2,950                     | 0,000                     | 2,989                     |
| 195   | 97,5681    | 2,975                     | 0,000                     | 2,988                     |
| 200   | 97,5681    | 3,000                     | 0,000                     | 2,988                     |
| 205   | 97,5709    | 3,250                     | 0,000                     | 2,989                     |
| 210   | 97,5790    | 3,500                     | 0,000                     | 2,991                     |
| 215   | 97,5923    | 3,750                     | 0,000                     | 2,993                     |
| 220   | 97,6108    | 4,000                     | 0,000                     | 2,997                     |
| 225   | 97,6344    | 4,250                     | 0,000                     | 3,002                     |
| 230   | 97,6632    | 4,500                     | 0,000                     | 3,007                     |
| 235   | 97,6971    | 4,750                     | 0,000                     | 3,014                     |
| 240   | 97,7360    | 5,000                     | 0,000                     | 3,021                     |
| 245   | 97,7799    | 5,250                     | 0,000                     | 3,030                     |
| 250   | 97,8289    | 5,500                     | 0,000                     | 3,040                     |
| 255   | 97,8828    | 5,750                     | 0,000                     | 3,050                     |
| 260   | 97,9417    | 6,000                     | 0,000                     | 3,061                     |
| 265   | 98,0054    | 6,250                     | 0,000                     | 3,074                     |
| 270   | 98,0740    | 6,500                     | 0,000                     | 3,087                     |
| 275   | 98,1474    | 6,750                     | 0,000                     | 3,101                     |
| 280   | 98,2255    | 7,000                     | 0,000                     | 3,116                     |
| 285   | 98,3084    | 7,250                     | 0,000                     | 3,131                     |
| 290   | 98,3960    | 7,500                     | 0,000                     | 3,148                     |
| 295   | 98,4883    | 7,750                     | 0,000                     | 3,165                     |
| 300   | 98,5851    | 8,000                     | 0,000                     | 3,183                     |
| 305   | 98,6837    | 7,975                     | 0,000                     | 3,201                     |
| 310   | 98,7812    | 7,950                     | 0,000                     | 3,219                     |
| 315   | 98,8777    | 7,925                     | 0,000                     | 3,237                     |
| 320   | 98,9731    | 7,900                     | 0,000                     | 3,254                     |
| 325   | 99,0674    | 7,875                     | 0,000                     | 3,271                     |
| 330   | 99,1607    | 7,850                     | 0,000                     | 3,288                     |
| 335   | 99,2530    | 7,825                     | 0,000                     | 3,305                     |
| 340   | 99,3443    | 7,800                     | 0,000                     | 3,321                     |
| 345   | 99,4345    | 7,775                     | 0,000                     | 3,337                     |
| 350   | 99,5238    | 7,750                     | 0,000                     | 3,353                     |
| 355   | 99,6121    | 7,725                     | 0,000                     | 3,368                     |
| 360   | 99,6995    | 7,700                     | 0,000                     | 3,384                     |
| 365   | 99,7858    | 7,675                     | 0,000                     | 3,399                     |
| 370   | 99,8713    | 7,650                     | 0,000                     | 3,413                     |
| 375   | 99,9557    | 7,625                     | 0,000                     | 3,428                     |
| 380   | 100,0390   | 7,600                     | 0,027                     | 3,442                     |
| 385   | 100,1199   | 7,575                     | 0,147                     | 3,456                     |
| 390   | 100,1972   | 7,550                     | 0,310                     | 3,469                     |
| 395   | 100,2701   | 7,525                     | 0,497                     | 3,482                     |
| 400   | 100,3383   | 7,500                     | 0,697                     | 3,493                     |
| 405   | 100,4017   | 7,475                     | 0,902                     | 3,504                     |
| 410   | 100,4603   | 7,450                     | 1,106                     | 3,514                     |
| 415   | 100,5141   | 7,425                     | 1,306                     | 3,523                     |
| 420   | 100,5633   | 7,400                     | 1,498                     | 3,531                     |
| 425   | 100,6082   | 7,375                     | 1,681                     | 3,539                     |
| 430   | 100,6489   | 7,350                     | 1,852                     | 3,546                     |
| 435   | 100,6856   | 7,325                     | 2,012                     | 3,552                     |
| 440   | 100,7187   | 7,300                     | 2,159                     | 3,557                     |
| 445   | 100,7484   | 7,275                     | 2,294                     | 3,562                     |
| 450   | 100,7749   | 7,250                     | 2,417                     | 3,566                     |
| 455   | 100,7985   | 7,225                     | 2,529                     | 3,570                     |
| 460   | 100,8195   | 7,200                     | 2,629                     | 3,574                     |
| 465   | 100,8380   | 7,175                     | 2,718                     | 3,577                     |
| 470   | 100,8543   | 7,150                     | 2,798                     | 3,580                     |
| 475   | 100,8686   | 7,125                     | 2,869                     | 3,582                     |
| 480   | 100,8810   | 7,100                     | 2,930                     | 3,584                     |
| 485   | 100,8918   | 7,075                     | 2,984                     | 3,586                     |
| 490   | 100,9010   | 7,050                     | 3,031                     | 3,587                     |
| 495   | 100,9089   | 7,025                     | 3,070                     | 3,589                     |
| 500   | 100,9155   | 7,000                     | 3,104                     | 3,590                     |
| 505   | 100,9209   | 6,963                     | 3,131                     | 3,591                     |
| 510   | 100,9250   | 6,925                     | 3,153                     | 3,591                     |
| 515   | 100,9281   | 6,888                     | 3,168                     | 3,592                     |
| 520   | 100,9301   | 6,850                     | 3,179                     | 3,592                     |
| 525   | 100,9313   | 6,813                     | 3,185                     | 3,592                     |
| 530   | 100,9316   | 6,775                     | 3,186                     | 3,592                     |
| 535   | 100,9312   | 6,738                     | 3,184                     | 3,592                     |
| 540   | 100,9301   | 6,700                     | 3,178                     | 3,592                     |
| 545   | 100,9284   | 6,663                     | 3,170                     | 3,592                     |
| 550   | 100,9262   | 6,625                     | 3,159                     | 3,591                     |
| 555   | 100,9235   | 6,588                     | 3,145                     | 3,591                     |
| 560   | 100,9204   | 6,550                     | 3,129                     | 3,590                     |
| 565   | 100,9169   | 6,513                     | 3,111                     | 3,590                     |
| 570   | 100,9130   | 6,475                     | 3,091                     | 3,589                     |
| 575   | 100,9088   | 6,438                     | 3,070                     | 3,589                     |
| 580   | 100,9043   | 6,400                     | 3,047                     | 3,588                     |
| 585   | 100,8995   | 6,363                     | 3,023                     | 3,587                     |
| 590   | 100,8945   | 6,325                     | 2,998                     | 3,586                     |
| 595   | 100,8893   | 6,288                     | 2,972                     | 3,585                     |
| 600   | 100,8839   | 6,250                     | 2,945                     | 3,584                     |
| 605   | 100,8783   | 6,213                     | 2,917                     | 3,584                     |
| 610   | 100,8725   | 6,175                     | 2,888                     | 3,583                     |
| 615   | 100,8666   | 6,138                     | 2,859                     | 3,582                     |
| 620   | 100,8606   | 6,100                     | 2,829                     | 3,581                     |
| 625   | 100,8544   | 6,063                     | 2,799                     | 3,580                     |
| 630   | 100,8481   | 6,025                     | 2,768                     | 3,579                     |

Tablica 1 - nastavak. Dotok  $Q_0$ , protok  $Q_I$  i preljeveni protok  $Q_p$  za dužinu preljevnog praga  $B=2$  (m) u ovisnosti o vremenu  $t$

| t (s) | h (m n.m.) | $Q_0$ (m <sup>3</sup> /s) | $Q_p$ (m <sup>3</sup> /s) | $Q_I$ (m <sup>3</sup> /s) |
|-------|------------|---------------------------|---------------------------|---------------------------|
| 635   | 100,8418   | 5,988                     | 2,737                     | 3,578                     |
| 640   | 100,8353   | 5,950                     | 2,705                     | 3,576                     |
| 645   | 100,8287   | 5,913                     | 2,673                     | 3,575                     |
| 650   | 100,8220   | 5,875                     | 2,641                     | 3,574                     |
| 655   | 100,8152   | 5,838                     | 2,608                     | 3,573                     |
| 660   | 100,8084   | 5,800                     | 2,576                     | 3,572                     |
| 665   | 100,8015   | 5,763                     | 2,543                     | 3,571                     |
| 670   | 100,7946   | 5,725                     | 2,510                     | 3,570                     |
| 675   | 100,7875   | 5,688                     | 2,476                     | 3,569                     |
| 680   | 100,7804   | 5,650                     | 2,443                     | 3,567                     |
| 685   | 100,7733   | 5,613                     | 2,410                     | 3,566                     |
| 690   | 100,7661   | 5,575                     | 2,376                     | 3,565                     |
| 695   | 100,7588   | 5,538                     | 2,342                     | 3,564                     |
| 700   | 100,7515   | 5,500                     | 2,309                     | 3,563                     |
| 705   | 100,7442   | 5,463                     | 2,275                     | 3,561                     |
| 710   | 100,7367   | 5,425                     | 2,241                     | 3,560                     |
| 715   | 100,7293   | 5,388                     | 2,207                     | 3,559                     |
| 720   | 100,7218   | 5,350                     | 2,173                     | 3,558                     |
| 725   | 100,7142   | 5,313                     | 2,139                     | 3,556                     |
| 730   | 100,7066   | 5,275                     | 2,105                     | 3,555                     |
| 735   | 100,6990   | 5,238                     | 2,071                     | 3,554                     |
| 740   | 100,6913   | 5,200                     | 2,037                     | 3,553                     |
| 745   | 100,6836   | 5,163                     | 2,003                     | 3,551                     |
| 750   | 100,6758   | 5,125                     | 1,969                     | 3,550                     |
| 755   | 100,6680   | 5,088                     | 1,935                     | 3,549                     |
| 760   | 100,6602   | 5,050                     | 1,901                     | 3,547                     |
| 765   | 100,6523   | 5,013                     | 1,867                     | 3,546                     |
| 770   | 100,6443   | 4,975                     | 1,833                     | 3,545                     |
| 775   | 100,6363   | 4,938                     | 1,799                     | 3,543                     |
| 780   | 100,6283   | 4,900                     | 1,765                     | 3,542                     |
| 785   | 100,6202   | 4,863                     | 1,731                     | 3,541                     |
| 790   | 100,6121   | 4,825                     | 1,697                     | 3,539                     |
| 795   | 100,6039   | 4,788                     | 1,663                     | 3,538                     |
| 800   | 100,5957   | 4,750                     | 1,629                     | 3,537                     |
| 805   | 100,5874   | 4,713                     | 1,595                     | 3,535                     |
| 810   | 100,5791   | 4,675                     | 1,562                     | 3,534                     |
| 815   | 100,5708   | 4,638                     | 1,528                     | 3,532                     |
| 820   | 100,5624   | 4,600                     | 1,494                     | 3,531                     |
| 825   | 100,5539   | 4,563                     | 1,461                     | 3,530                     |
| 830   | 100,5454   | 4,525                     | 1,427                     | 3,528                     |
| 835   | 100,5368   | 4,488                     | 1,394                     | 3,527                     |
| 840   | 100,5282   | 4,450                     | 1,360                     | 3,525                     |
| 845   | 100,5196   | 4,413                     | 1,327                     | 3,524                     |
| 850   | 100,5108   | 4,375                     | 1,294                     | 3,522                     |
| 855   | 100,5020   | 4,338                     | 1,261                     | 3,521                     |
| 860   | 100,4932   | 4,300                     | 1,227                     | 3,519                     |
| 865   | 100,4843   | 4,263                     | 1,194                     | 3,518                     |
| 870   | 100,4754   | 4,225                     | 1,161                     | 3,516                     |
| 875   | 100,4663   | 4,188                     | 1,128                     | 3,515                     |
| 880   | 100,4573   | 4,150                     | 1,096                     | 3,513                     |
| 885   | 100,4481   | 4,113                     | 1,063                     | 3,512                     |
| 890   | 100,4389   | 4,075                     | 1,030                     | 3,510                     |
| 895   | 100,4296   | 4,038                     | 0,998                     | 3,509                     |
| 900   | 100,4203   | 4,000                     | 0,965                     | 3,507                     |
| 905   | 100,4109   | 3,967                     | 0,933                     | 3,506                     |
| 910   | 100,4015   | 3,933                     | 0,901                     | 3,504                     |
| 915   | 100,3921   | 3,900                     | 0,870                     | 3,502                     |
| 920   | 100,3827   | 3,867                     | 0,839                     | 3,501                     |
| 925   | 100,3733   | 3,833                     | 0,808                     | 3,499                     |
| 930   | 100,3638   | 3,800                     | 0,778                     | 3,498                     |
| 935   | 100,3544   | 3,767                     | 0,748                     | 3,496                     |
| 940   | 100,3449   | 3,733                     | 0,718                     | 3,494                     |
| 945   | 100,3353   | 3,700                     | 0,688                     | 3,493                     |
| 950   | 100,3257   | 3,667                     | 0,659                     | 3,491                     |
| 955   | 100,3161   | 3,633                     | 0,630                     | 3,490                     |
| 960   | 100,3064   | 3,600                     | 0,601                     | 3,488                     |
| 965   | 100,2966   | 3,567                     | 0,572                     | 3,486                     |
| 970   | 100,2868   | 3,533                     | 0,544                     | 3,485                     |

| t (s) | h (m n.m.) | $Q_0$ (m <sup>3</sup> /s) | $Q_p$ (m <sup>3</sup> /s) | $Q_I$ (m <sup>3</sup> /s) |
|-------|------------|---------------------------|---------------------------|---------------------------|
| 975   | 100,2769   | 3,500                     | 0,516                     | 3,483                     |
| 980   | 100,2669   | 3,467                     | 0,489                     | 3,481                     |
| 985   | 100,2568   | 3,433                     | 0,461                     | 3,480                     |
| 990   | 100,2467   | 3,400                     | 0,434                     | 3,478                     |
| 995   | 100,2364   | 3,367                     | 0,407                     | 3,476                     |
| 1000  | 100,2261   | 3,333                     | 0,381                     | 3,474                     |
| 1005  | 100,2156   | 3,300                     | 0,355                     | 3,473                     |
| 1010  | 100,2051   | 3,267                     | 0,329                     | 3,471                     |
| 1015  | 100,1944   | 3,233                     | 0,304                     | 3,469                     |
| 1020  | 100,1836   | 3,200                     | 0,279                     | 3,467                     |
| 1025  | 100,1726   | 3,167                     | 0,254                     | 3,465                     |
| 1030  | 100,1615   | 3,133                     | 0,230                     | 3,463                     |
| 1035  | 100,1503   | 3,100                     | 0,206                     | 3,461                     |
| 1040  | 100,1388   | 3,067                     | 0,183                     | 3,459                     |
| 1045  | 100,1273   | 3,033                     | 0,161                     | 3,458                     |
| 1050  | 100,1155   | 3,000                     | 0,139                     | 3,455                     |
| 1055  | 100,1035   | 2,967                     | 0,118                     | 3,453                     |
| 1060  | 100,0913   | 2,933                     | 0,098                     | 3,451                     |
| 1065  | 100,0789   | 2,900                     | 0,079                     | 3,449                     |
| 1070  | 100,0662   | 2,867                     | 0,060                     | 3,447                     |
| 1075  | 100,0533   | 2,833                     | 0,044                     | 3,445                     |
| 1080  | 100,0400   | 2,800                     | 0,028                     | 3,443                     |
| 1085  | 100,0264   | 2,767                     | 0,015                     | 3,440                     |
| 1090  | 100,0125   | 2,733                     | 0,005                     | 3,438                     |
| 1095  | 99,9980    | 2,700                     | 0,000                     | 3,435                     |
| 1100  | 99,9830    | 2,667                     | 0,000                     | 3,433                     |
| 1105  | 99,9674    | 2,633                     | 0,000                     | 3,430                     |
| 1110  | 99,9511    | 2,600                     | 0,000                     | 3,427                     |
| 1115  | 99,9342    | 2,567                     | 0,000                     | 3,424                     |
| 1120  | 99,9168    | 2,533                     | 0,000                     | 3,421                     |
| 1125  | 99,8987    | 2,500                     | 0,000                     | 3,418                     |
| 1130  | 99,8800    | 2,467                     | 0,000                     | 3,415                     |
| 1135  | 99,8606    | 2,433                     | 0,000                     | 3,412                     |
| 1140  | 99,8407    | 2,400                     | 0,000                     | 3,408                     |
| 1145  | 99,8202    | 2,367                     | 0,000                     | 3,405                     |
| 1150  | 99,7990    | 2,333                     | 0,000                     | 3,401                     |
| 1155  | 99,7773    | 2,300                     | 0,000                     | 3,397                     |
| 1160  | 99,7550    | 2,267                     | 0,000                     | 3,393                     |
| 1165  | 99,7320    | 2,233                     | 0,000                     | 3,389                     |
| 1170  | 99,7085    | 2,200                     | 0,000                     | 3,385                     |
| 1175  | 99,6843    | 2,167                     | 0,000                     | 3,381                     |
| 1180  | 99,6596    | 2,133                     | 0,000                     | 3,377                     |
| 1185  | 99,6343    | 2,100                     | 0,000                     | 3,372                     |
| 1190  | 99,6083    | 2,067                     | 0,000                     | 3,368                     |
| 1195  | 99,5818    | 2,033                     | 0,000                     | 3,363                     |
| 1200  | 99,5547    | 2,000                     | 0,000                     | 3,358                     |
| 1205  | 99,5273    | 2,000                     | 0,000                     | 3,353                     |
| 1210  | 99,5000    | 2,000                     | 0,000                     | 3,349                     |
| 1215  | 99,4728    | 2,000                     | 0,000                     | 3,344                     |
| 1220  | 99,4457    | 2,000                     | 0,000                     | 3,339                     |
| 1225  | 99,4187    | 2,000                     | 0,000                     | 3,334                     |
| 1230  | 99,3917    | 2,000                     | 0,000                     | 3,329                     |
| 1235  | 99,3648    | 2,000                     | 0,000                     | 3,325                     |
| 1240  | 99,3381    | 2,000                     | 0,000                     | 3,320                     |
| 1245  | 99,3113    | 2,000                     | 0,000                     | 3,315                     |
| 1250  | 99,2847    | 2,000                     | 0,000                     | 3,310                     |
| 1255  | 99,2582    | 2,000                     | 0,000                     | 3,306                     |
| 1260  | 99,2317    | 2,000                     | 0,000                     | 3,301                     |
| 1265  | 99,2053    | 2,000                     | 0,000                     | 3,296                     |
| 1270  | 99,1790    | 2,000                     | 0,000                     | 3,291                     |
| 1275  | 99,1528    | 2,000                     | 0,000                     | 3,287                     |
| 1280  | 99,1267    | 2,000                     | 0,000                     | 3,282                     |
| 1285  | 99,1006    | 2,000                     | 0,000                     | 3,277                     |
| 1290  | 99,0746    | 2,000                     | 0,000                     | 3,273                     |
| 1295  | 99,0487    | 2,000                     | 0,000                     | 3,268                     |
| 1300  | 99,0229    | 2,000                     | 0,000                     | 3,263                     |

Tablica 2. Dotok  $Q_0$ , protok  $Q_1$  i preljevni protok  $Q_p$  za dužinu preljevnog praga  $B=4$  (m) u ovisnosti o vremenu  $t$

| t (s) | h (m n.m.) | $Q_0$ (m <sup>3</sup> /s) | $Q_p$ (m <sup>3</sup> /s) | $Q_1$ (m <sup>3</sup> /s) |
|-------|------------|---------------------------|---------------------------|---------------------------|
| 0     | 98,000     | 2,000                     | 0,000                     | 3,073                     |
| 5     | 97,9780    | 2,025                     | 0,000                     | 3,068                     |
| 10    | 97,9565    | 2,050                     | 0,000                     | 3,064                     |
| 15    | 97,9357    | 2,075                     | 0,000                     | 3,060                     |
| 20    | 97,9154    | 2,100                     | 0,000                     | 3,056                     |
| 25    | 97,8957    | 2,125                     | 0,000                     | 3,053                     |
| 30    | 97,8767    | 2,150                     | 0,000                     | 3,049                     |
| 35    | 97,8582    | 2,175                     | 0,000                     | 3,045                     |
| 40    | 97,8403    | 2,200                     | 0,000                     | 3,042                     |
| 45    | 97,8230    | 2,225                     | 0,000                     | 3,038                     |
| 50    | 97,8063    | 2,250                     | 0,000                     | 3,035                     |
| 55    | 97,7901    | 2,275                     | 0,000                     | 3,032                     |
| 60    | 97,7746    | 2,300                     | 0,000                     | 3,029                     |
| 65    | 97,7596    | 2,325                     | 0,000                     | 3,026                     |
| 70    | 97,7452    | 2,350                     | 0,000                     | 3,023                     |
| 75    | 97,7314    | 2,375                     | 0,000                     | 3,021                     |
| 80    | 97,7182    | 2,400                     | 0,000                     | 3,018                     |
| 85    | 97,7055    | 2,425                     | 0,000                     | 3,015                     |
| 90    | 97,6934    | 2,450                     | 0,000                     | 3,013                     |
| 95    | 97,6819    | 2,475                     | 0,000                     | 3,011                     |
| 100   | 97,6710    | 2,500                     | 0,000                     | 3,009                     |
| 105   | 97,6606    | 2,525                     | 0,000                     | 3,007                     |
| 110   | 97,6507    | 2,550                     | 0,000                     | 3,005                     |
| 115   | 97,6415    | 2,575                     | 0,000                     | 3,003                     |
| 120   | 97,6328    | 2,600                     | 0,000                     | 3,001                     |
| 125   | 97,6246    | 2,625                     | 0,000                     | 3,000                     |
| 130   | 97,6170    | 2,650                     | 0,000                     | 2,998                     |
| 135   | 97,6100    | 2,675                     | 0,000                     | 2,997                     |
| 140   | 97,6035    | 2,700                     | 0,000                     | 2,995                     |
| 145   | 97,5976    | 2,725                     | 0,000                     | 2,994                     |
| 150   | 97,5922    | 2,750                     | 0,000                     | 2,993                     |
| 155   | 97,5874    | 2,775                     | 0,000                     | 2,992                     |
| 160   | 97,5831    | 2,800                     | 0,000                     | 2,991                     |
| 165   | 97,5793    | 2,825                     | 0,000                     | 2,991                     |
| 170   | 97,5761    | 2,850                     | 0,000                     | 2,990                     |
| 175   | 97,5734    | 2,875                     | 0,000                     | 2,990                     |
| 180   | 97,5713    | 2,900                     | 0,000                     | 2,989                     |
| 185   | 97,5697    | 2,925                     | 0,000                     | 2,989                     |
| 190   | 97,5686    | 2,950                     | 0,000                     | 2,989                     |
| 195   | 97,5681    | 2,975                     | 0,000                     | 2,988                     |
| 200   | 97,5681    | 3,000                     | 0,000                     | 2,988                     |
| 205   | 97,5709    | 3,250                     | 0,000                     | 2,989                     |
| 210   | 97,5790    | 3,500                     | 0,000                     | 2,991                     |
| 215   | 97,5923    | 3,750                     | 0,000                     | 2,993                     |
| 220   | 97,6108    | 4,000                     | 0,000                     | 2,997                     |
| 225   | 97,6344    | 4,250                     | 0,000                     | 3,002                     |
| 230   | 97,6632    | 4,500                     | 0,000                     | 3,007                     |
| 235   | 97,6971    | 4,750                     | 0,000                     | 3,014                     |
| 240   | 97,7360    | 5,000                     | 0,000                     | 3,021                     |
| 245   | 97,7799    | 5,250                     | 0,000                     | 3,030                     |
| 250   | 97,8289    | 5,500                     | 0,000                     | 3,040                     |
| 255   | 97,8828    | 5,750                     | 0,000                     | 3,050                     |
| 260   | 97,9417    | 6,000                     | 0,000                     | 3,061                     |
| 265   | 98,0054    | 6,250                     | 0,000                     | 3,074                     |
| 270   | 98,0740    | 6,500                     | 0,000                     | 3,087                     |
| 275   | 98,1474    | 6,750                     | 0,000                     | 3,101                     |
| 280   | 98,2255    | 7,000                     | 0,000                     | 3,116                     |
| 285   | 98,3084    | 7,250                     | 0,000                     | 3,131                     |
| 290   | 98,3960    | 7,500                     | 0,000                     | 3,148                     |
| 295   | 98,4883    | 7,750                     | 0,000                     | 3,165                     |
| 300   | 98,5851    | 8,000                     | 0,000                     | 3,183                     |
| 305   | 98,6837    | 7,975                     | 0,000                     | 3,201                     |
| 310   | 98,7812    | 7,950                     | 0,000                     | 3,219                     |
| 315   | 98,8777    | 7,925                     | 0,000                     | 3,237                     |
| 320   | 98,9731    | 7,900                     | 0,000                     | 3,254                     |
| 325   | 99,0674    | 7,875                     | 0,000                     | 3,271                     |
| 330   | 99,1607    | 7,850                     | 0,000                     | 3,288                     |
| 335   | 99,2530    | 7,825                     | 0,000                     | 3,305                     |
| 340   | 99,3443    | 7,800                     | 0,000                     | 3,321                     |
| 345   | 99,4345    | 7,775                     | 0,000                     | 3,337                     |
| 350   | 99,5238    | 7,750                     | 0,000                     | 3,353                     |
| 355   | 99,6121    | 7,725                     | 0,000                     | 3,368                     |
| 360   | 99,6995    | 7,700                     | 0,000                     | 3,384                     |
| 365   | 99,7858    | 7,675                     | 0,000                     | 3,399                     |
| 370   | 99,8713    | 7,650                     | 0,000                     | 3,413                     |
| 375   | 99,9557    | 7,625                     | 0,000                     | 3,428                     |
| 380   | 100,0388   | 7,600                     | 0,054                     | 3,442                     |
| 385   | 100,1180   | 7,575                     | 0,287                     | 3,456                     |
| 390   | 100,1910   | 7,550                     | 0,592                     | 3,468                     |
| 395   | 100,2569   | 7,525                     | 0,923                     | 3,480                     |
| 400   | 100,3154   | 7,500                     | 1,256                     | 3,490                     |
| 405   | 100,3667   | 7,475                     | 1,574                     | 3,498                     |
| 410   | 100,4112   | 7,450                     | 1,869                     | 3,506                     |
| 415   | 100,4495   | 7,425                     | 2,136                     | 3,512                     |
| 420   | 100,4821   | 7,400                     | 2,373                     | 3,518                     |
| 425   | 100,5097   | 7,375                     | 2,579                     | 3,522                     |
| 430   | 100,5330   | 7,350                     | 2,757                     | 3,526                     |
| 435   | 100,5523   | 7,325                     | 2,909                     | 3,529                     |
| 440   | 100,5683   | 7,300                     | 3,037                     | 3,532                     |
| 445   | 100,5815   | 7,275                     | 3,143                     | 3,534                     |
| 450   | 100,5922   | 7,250                     | 3,230                     | 3,536                     |
| 455   | 100,6009   | 7,225                     | 3,301                     | 3,537                     |
| 460   | 100,6077   | 7,200                     | 3,357                     | 3,539                     |
| 465   | 100,6130   | 7,175                     | 3,402                     | 3,540                     |
| 470   | 100,6171   | 7,150                     | 3,435                     | 3,540                     |
| 475   | 100,6200   | 7,125                     | 3,460                     | 3,541                     |
| 480   | 100,6221   | 7,100                     | 3,477                     | 3,541                     |
| 485   | 100,6233   | 7,075                     | 3,488                     | 3,541                     |
| 490   | 100,6239   | 7,050                     | 3,493                     | 3,541                     |
| 495   | 100,6240   | 7,025                     | 3,493                     | 3,541                     |
| 500   | 100,6236   | 7,000                     | 3,490                     | 3,541                     |
| 505   | 100,6227   | 6,963                     | 3,482                     | 3,541                     |
| 510   | 100,6212   | 6,925                     | 3,470                     | 3,541                     |
| 515   | 100,6193   | 6,888                     | 3,454                     | 3,541                     |
| 520   | 100,6170   | 6,850                     | 3,435                     | 3,540                     |
| 525   | 100,6144   | 6,813                     | 3,413                     | 3,540                     |
| 530   | 100,6115   | 6,775                     | 3,389                     | 3,539                     |
| 535   | 100,6083   | 6,738                     | 3,363                     | 3,539                     |
| 540   | 100,6050   | 6,700                     | 3,335                     | 3,538                     |
| 545   | 100,6015   | 6,663                     | 3,306                     | 3,538                     |
| 550   | 100,5978   | 6,625                     | 3,276                     | 3,537                     |
| 555   | 100,5941   | 6,588                     | 3,245                     | 3,536                     |
| 560   | 100,5902   | 6,550                     | 3,213                     | 3,536                     |
| 565   | 100,5862   | 6,513                     | 3,181                     | 3,535                     |
| 570   | 100,5821   | 6,475                     | 3,148                     | 3,534                     |
| 575   | 100,5780   | 6,438                     | 3,114                     | 3,534                     |
| 580   | 100,5738   | 6,400                     | 3,080                     | 3,533                     |
| 585   | 100,5695   | 6,363                     | 3,046                     | 3,532                     |
| 590   | 100,5652   | 6,325                     | 3,012                     | 3,532                     |
| 595   | 100,5609   | 6,288                     | 2,977                     | 3,531                     |
| 600   | 100,5565   | 6,250                     | 2,942                     | 3,530                     |
| 605   | 100,5521   | 6,213                     | 2,907                     | 3,529                     |
| 610   | 100,5476   | 6,175                     | 2,872                     | 3,529                     |
| 615   | 100,5431   | 6,138                     | 2,837                     | 3,528                     |
| 620   | 100,5386   | 6,100                     | 2,801                     | 3,527                     |
| 625   | 100,5341   | 6,063                     | 2,766                     | 3,526                     |
| 630   | 100,5295   | 6,025                     | 2,731                     | 3,526                     |

Tablica 2 - nastavak. Dotok  $Q_0$ , protok  $Q_1$  i preljevni protok  $Q_p$  za dužinu preljevno praga  $B=4$  (m) u ovisnosti o vremenu  $t$

| t (s) | h (m n.m.) | $Q_0$ (m <sup>3</sup> /s) | $Q_p$ (m <sup>3</sup> /s) | $Q_1$ (m <sup>3</sup> /s) |
|-------|------------|---------------------------|---------------------------|---------------------------|
| 635   | 100,5249   | 5,988                     | 2,695                     | 3,525                     |
| 640   | 100,5203   | 5,950                     | 2,660                     | 3,524                     |
| 645   | 100,5156   | 5,913                     | 2,624                     | 3,523                     |
| 650   | 100,5110   | 5,875                     | 2,589                     | 3,522                     |
| 655   | 100,5063   | 5,838                     | 2,553                     | 3,522                     |
| 660   | 100,5016   | 5,800                     | 2,517                     | 3,521                     |
| 665   | 100,4968   | 5,763                     | 2,482                     | 3,520                     |
| 670   | 100,4921   | 5,725                     | 2,446                     | 3,519                     |
| 675   | 100,4873   | 5,688                     | 2,411                     | 3,518                     |
| 680   | 100,4825   | 5,650                     | 2,375                     | 3,518                     |
| 685   | 100,4776   | 5,613                     | 2,339                     | 3,517                     |
| 690   | 100,4728   | 5,575                     | 2,304                     | 3,516                     |
| 695   | 100,4679   | 5,538                     | 2,268                     | 3,515                     |
| 700   | 100,4630   | 5,500                     | 2,233                     | 3,514                     |
| 705   | 100,4581   | 5,463                     | 2,197                     | 3,514                     |
| 710   | 100,4531   | 5,425                     | 2,162                     | 3,513                     |
| 715   | 100,4482   | 5,388                     | 2,126                     | 3,512                     |
| 720   | 100,4432   | 5,350                     | 2,091                     | 3,511                     |
| 725   | 100,4382   | 5,313                     | 2,056                     | 3,510                     |
| 730   | 100,4331   | 5,275                     | 2,020                     | 3,509                     |
| 735   | 100,4281   | 5,238                     | 1,985                     | 3,509                     |
| 740   | 100,4230   | 5,200                     | 1,949                     | 3,508                     |
| 745   | 100,4178   | 5,163                     | 1,914                     | 3,507                     |
| 750   | 100,4127   | 5,125                     | 1,879                     | 3,506                     |
| 755   | 100,4075   | 5,088                     | 1,844                     | 3,505                     |
| 760   | 100,4023   | 5,050                     | 1,808                     | 3,504                     |
| 765   | 100,3971   | 5,013                     | 1,773                     | 3,503                     |
| 770   | 100,3918   | 4,975                     | 1,738                     | 3,502                     |
| 775   | 100,3865   | 4,938                     | 1,703                     | 3,502                     |
| 780   | 100,3812   | 4,900                     | 1,668                     | 3,501                     |
| 785   | 100,3758   | 4,863                     | 1,633                     | 3,500                     |
| 790   | 100,3705   | 4,825                     | 1,598                     | 3,499                     |
| 795   | 100,3650   | 4,788                     | 1,563                     | 3,498                     |
| 800   | 100,3596   | 4,750                     | 1,528                     | 3,497                     |
| 805   | 100,3541   | 4,713                     | 1,493                     | 3,496                     |
| 810   | 100,3486   | 4,675                     | 1,458                     | 3,495                     |
| 815   | 100,3430   | 4,638                     | 1,424                     | 3,494                     |
| 820   | 100,3374   | 4,600                     | 1,389                     | 3,493                     |
| 825   | 100,3318   | 4,563                     | 1,354                     | 3,492                     |
| 830   | 100,3261   | 4,525                     | 1,320                     | 3,491                     |
| 835   | 100,3204   | 4,488                     | 1,285                     | 3,490                     |
| 840   | 100,3146   | 4,450                     | 1,251                     | 3,489                     |
| 845   | 100,3088   | 4,413                     | 1,216                     | 3,488                     |
| 850   | 100,3030   | 4,375                     | 1,182                     | 3,487                     |
| 855   | 100,2971   | 4,338                     | 1,148                     | 3,486                     |
| 860   | 100,2912   | 4,300                     | 1,114                     | 3,485                     |
| 865   | 100,2852   | 4,263                     | 1,080                     | 3,484                     |
| 870   | 100,2792   | 4,225                     | 1,045                     | 3,483                     |
| 875   | 100,2731   | 4,188                     | 1,012                     | 3,482                     |
| 880   | 100,2670   | 4,150                     | 0,978                     | 3,481                     |
| 885   | 100,2608   | 4,113                     | 0,944                     | 3,480                     |
| 890   | 100,2546   | 4,075                     | 0,910                     | 3,479                     |
| 895   | 100,2483   | 4,038                     | 0,877                     | 3,478                     |
| 900   | 100,2419   | 4,000                     | 0,843                     | 3,477                     |
| 905   | 100,2356   | 3,967                     | 0,810                     | 3,476                     |
| 910   | 100,2292   | 3,933                     | 0,778                     | 3,475                     |
| 915   | 100,2228   | 3,900                     | 0,745                     | 3,474                     |
| 920   | 100,2165   | 3,867                     | 0,714                     | 3,473                     |
| 925   | 100,2101   | 3,833                     | 0,682                     | 3,472                     |
| 930   | 100,2037   | 3,800                     | 0,651                     | 3,471                     |
| 935   | 100,1972   | 3,767                     | 0,621                     | 3,469                     |
| 940   | 100,1908   | 3,733                     | 0,591                     | 3,468                     |
| 945   | 100,1843   | 3,700                     | 0,561                     | 3,467                     |
| 950   | 100,1777   | 3,667                     | 0,531                     | 3,466                     |
| 955   | 100,1711   | 3,633                     | 0,501                     | 3,465                     |
| 960   | 100,1644   | 3,600                     | 0,472                     | 3,464                     |
| 965   | 100,1577   | 3,567                     | 0,444                     | 3,463                     |
| 970   | 100,1508   | 3,533                     | 0,415                     | 3,462                     |

| t (s) | h (m n.m.) | $Q_0$ (m <sup>3</sup> /s) | $Q_p$ (m <sup>3</sup> /s) | $Q_1$ (m <sup>3</sup> /s) |
|-------|------------|---------------------------|---------------------------|---------------------------|
| 975   | 100,1440   | 3,500                     | 0,387                     | 3,460                     |
| 980   | 100,1370   | 3,467                     | 0,359                     | 3,459                     |
| 985   | 100,1299   | 3,433                     | 0,332                     | 3,458                     |
| 990   | 100,1227   | 3,400                     | 0,305                     | 3,457                     |
| 995   | 100,1155   | 3,367                     | 0,278                     | 3,455                     |
| 1000  | 100,1081   | 3,333                     | 0,252                     | 3,454                     |
| 1005  | 100,1006   | 3,300                     | 0,226                     | 3,453                     |
| 1010  | 100,0929   | 3,267                     | 0,201                     | 3,452                     |
| 1015  | 100,0852   | 3,233                     | 0,176                     | 3,450                     |
| 1020  | 100,0772   | 3,200                     | 0,152                     | 3,449                     |
| 1025  | 100,0691   | 3,167                     | 0,129                     | 3,448                     |
| 1030  | 100,0609   | 3,133                     | 0,106                     | 3,446                     |
| 1035  | 100,0524   | 3,100                     | 0,085                     | 3,445                     |
| 1040  | 100,0437   | 3,067                     | 0,065                     | 3,443                     |
| 1045  | 100,0347   | 3,033                     | 0,046                     | 3,442                     |
| 1050  | 100,0255   | 3,000                     | 0,029                     | 3,440                     |
| 1055  | 100,0160   | 2,967                     | 0,014                     | 3,438                     |
| 1060  | 100,0060   | 2,933                     | 0,003                     | 3,437                     |
| 1065  | 99,9956    | 2,900                     | 0,000                     | 3,435                     |
| 1070  | 99,9846    | 2,867                     | 0,000                     | 3,433                     |
| 1075  | 99,9730    | 2,833                     | 0,000                     | 3,431                     |
| 1080  | 99,9607    | 2,800                     | 0,000                     | 3,429                     |
| 1085  | 99,9478    | 2,767                     | 0,000                     | 3,427                     |
| 1090  | 99,9342    | 2,733                     | 0,000                     | 3,424                     |
| 1095  | 99,9201    | 2,700                     | 0,000                     | 3,422                     |
| 1100  | 99,9053    | 2,667                     | 0,000                     | 3,419                     |
| 1105  | 99,8899    | 2,633                     | 0,000                     | 3,417                     |
| 1110  | 99,8739    | 2,600                     | 0,000                     | 3,414                     |
| 1115  | 99,8573    | 2,567                     | 0,000                     | 3,411                     |
| 1120  | 99,8401    | 2,533                     | 0,000                     | 3,408                     |
| 1125  | 99,8222    | 2,500                     | 0,000                     | 3,405                     |
| 1130  | 99,8037    | 2,467                     | 0,000                     | 3,402                     |
| 1135  | 99,7846    | 2,433                     | 0,000                     | 3,398                     |
| 1140  | 99,7650    | 2,400                     | 0,000                     | 3,395                     |
| 1145  | 99,7447    | 2,367                     | 0,000                     | 3,391                     |
| 1150  | 99,7237    | 2,333                     | 0,000                     | 3,388                     |
| 1155  | 99,7022    | 2,300                     | 0,000                     | 3,384                     |
| 1160  | 99,6801    | 2,267                     | 0,000                     | 3,380                     |
| 1165  | 99,6574    | 2,233                     | 0,000                     | 3,376                     |
| 1170  | 99,6341    | 2,200                     | 0,000                     | 3,372                     |
| 1175  | 99,6102    | 2,167                     | 0,000                     | 3,368                     |
| 1180  | 99,5857    | 2,133                     | 0,000                     | 3,364                     |
| 1185  | 99,5606    | 2,100                     | 0,000                     | 3,359                     |
| 1190  | 99,5348    | 2,067                     | 0,000                     | 3,355                     |
| 1195  | 99,5085    | 2,033                     | 0,000                     | 3,350                     |
| 1200  | 99,4817    | 2,000                     | 0,000                     | 3,345                     |
| 1205  | 99,4545    | 2,000                     | 0,000                     | 3,341                     |
| 1210  | 99,4274    | 2,000                     | 0,000                     | 3,336                     |
| 1215  | 99,4005    | 2,000                     | 0,000                     | 3,331                     |
| 1220  | 99,3736    | 2,000                     | 0,000                     | 3,326                     |
| 1225  | 99,3467    | 2,000                     | 0,000                     | 3,321                     |
| 1230  | 99,3200    | 2,000                     | 0,000                     | 3,317                     |
| 1235  | 99,2933    | 2,000                     | 0,000                     | 3,312                     |
| 1240  | 99,2668    | 2,000                     | 0,000                     | 3,307                     |
| 1245  | 99,2403    | 2,000                     | 0,000                     | 3,302                     |
| 1250  | 99,2139    | 2,000                     | 0,000                     | 3,298                     |
| 1255  | 99,1875    | 2,000                     | 0,000                     | 3,293                     |
| 1260  | 99,1613    | 2,000                     | 0,000                     | 3,288                     |
| 1265  | 99,1351    | 2,000                     | 0,000                     | 3,284                     |
| 1270  | 99,1090    | 2,000                     | 0,000                     | 3,279                     |
| 1275  | 99,0830    | 2,000                     | 0,000                     | 3,274                     |
| 1280  | 99,0571    | 2,000                     | 0,000                     | 3,270                     |
| 1285  | 99,0313    | 2,000                     | 0,000                     | 3,265                     |
| 1290  | 99,0055    | 2,000                     | 0,000                     | 3,260                     |
| 1295  | 98,9798    | 2,000                     | 0,000                     | 3,256                     |
| 1300  | 98,9543    | 2,000                     | 0,000                     | 3,251                     |



Tablica 3. Dotok  $Q_0$ , protok  $Q_1$  i preljevni protok  $Q_p$  za dužinu preljevnog praga  $B=6$  (m) u ovisnosti o vremenu  $t$

| t (s) | h (m n.m.) | $Q_0$ (m <sup>3</sup> /s) | $Q_p$ (m <sup>3</sup> /s) | $Q_1$ (m <sup>3</sup> /s) |
|-------|------------|---------------------------|---------------------------|---------------------------|
| 0     | 98,000     | 2,000                     | 0,000                     | 3,073                     |
| 5     | 97,9780    | 2,025                     | 0,000                     | 3,068                     |
| 10    | 97,9565    | 2,050                     | 0,000                     | 3,064                     |
| 15    | 97,9357    | 2,075                     | 0,000                     | 3,060                     |
| 20    | 97,9154    | 2,100                     | 0,000                     | 3,056                     |
| 25    | 97,8957    | 2,125                     | 0,000                     | 3,053                     |
| 30    | 97,8767    | 2,150                     | 0,000                     | 3,049                     |
| 35    | 97,8582    | 2,175                     | 0,000                     | 3,045                     |
| 40    | 97,8403    | 2,200                     | 0,000                     | 3,042                     |
| 45    | 97,8230    | 2,225                     | 0,000                     | 3,038                     |
| 50    | 97,8063    | 2,250                     | 0,000                     | 3,035                     |
| 55    | 97,7901    | 2,275                     | 0,000                     | 3,032                     |
| 60    | 97,7746    | 2,300                     | 0,000                     | 3,029                     |
| 65    | 97,7596    | 2,325                     | 0,000                     | 3,026                     |
| 70    | 97,7452    | 2,350                     | 0,000                     | 3,023                     |
| 75    | 97,7314    | 2,375                     | 0,000                     | 3,021                     |
| 80    | 97,7182    | 2,400                     | 0,000                     | 3,018                     |
| 85    | 97,7055    | 2,425                     | 0,000                     | 3,015                     |
| 90    | 97,6934    | 2,450                     | 0,000                     | 3,013                     |
| 95    | 97,6819    | 2,475                     | 0,000                     | 3,011                     |
| 100   | 97,6710    | 2,500                     | 0,000                     | 3,009                     |
| 105   | 97,6606    | 2,525                     | 0,000                     | 3,007                     |
| 110   | 97,6507    | 2,550                     | 0,000                     | 3,005                     |
| 115   | 97,6415    | 2,575                     | 0,000                     | 3,003                     |
| 120   | 97,6328    | 2,600                     | 0,000                     | 3,001                     |
| 125   | 97,6246    | 2,625                     | 0,000                     | 3,000                     |
| 130   | 97,6170    | 2,650                     | 0,000                     | 2,998                     |
| 135   | 97,6100    | 2,675                     | 0,000                     | 2,997                     |
| 140   | 97,6035    | 2,700                     | 0,000                     | 2,995                     |
| 145   | 97,5976    | 2,725                     | 0,000                     | 2,994                     |
| 150   | 97,5922    | 2,750                     | 0,000                     | 2,993                     |
| 155   | 97,5874    | 2,775                     | 0,000                     | 2,992                     |
| 160   | 97,5831    | 2,800                     | 0,000                     | 2,991                     |
| 165   | 97,5793    | 2,825                     | 0,000                     | 2,991                     |
| 170   | 97,5761    | 2,850                     | 0,000                     | 2,990                     |
| 175   | 97,5734    | 2,875                     | 0,000                     | 2,990                     |
| 180   | 97,5713    | 2,900                     | 0,000                     | 2,989                     |
| 185   | 97,5697    | 2,925                     | 0,000                     | 2,989                     |
| 190   | 97,5686    | 2,950                     | 0,000                     | 2,989                     |
| 195   | 97,5681    | 2,975                     | 0,000                     | 2,988                     |
| 200   | 97,5681    | 3,000                     | 0,000                     | 2,988                     |
| 205   | 97,5709    | 3,250                     | 0,000                     | 2,989                     |
| 210   | 97,5790    | 3,500                     | 0,000                     | 2,991                     |
| 215   | 97,5923    | 3,750                     | 0,000                     | 2,993                     |
| 220   | 97,6108    | 4,000                     | 0,000                     | 2,997                     |
| 225   | 97,6344    | 4,250                     | 0,000                     | 3,002                     |
| 230   | 97,6632    | 4,500                     | 0,000                     | 3,007                     |
| 235   | 97,6971    | 4,750                     | 0,000                     | 3,014                     |
| 240   | 97,7360    | 5,000                     | 0,000                     | 3,021                     |
| 245   | 97,7799    | 5,250                     | 0,000                     | 3,030                     |
| 250   | 97,8289    | 5,500                     | 0,000                     | 3,040                     |
| 255   | 97,8828    | 5,750                     | 0,000                     | 3,050                     |
| 260   | 97,9417    | 6,000                     | 0,000                     | 3,061                     |
| 265   | 98,0054    | 6,250                     | 0,000                     | 3,074                     |
| 270   | 98,0740    | 6,500                     | 0,000                     | 3,087                     |
| 275   | 98,1474    | 6,750                     | 0,000                     | 3,101                     |
| 280   | 98,2255    | 7,000                     | 0,000                     | 3,116                     |
| 285   | 98,3084    | 7,250                     | 0,000                     | 3,131                     |
| 290   | 98,3960    | 7,500                     | 0,000                     | 3,148                     |
| 295   | 98,4883    | 7,750                     | 0,000                     | 3,165                     |
| 300   | 98,5851    | 8,000                     | 0,000                     | 3,183                     |
| 305   | 98,6837    | 7,975                     | 0,000                     | 3,201                     |
| 310   | 98,7812    | 7,950                     | 0,000                     | 3,219                     |

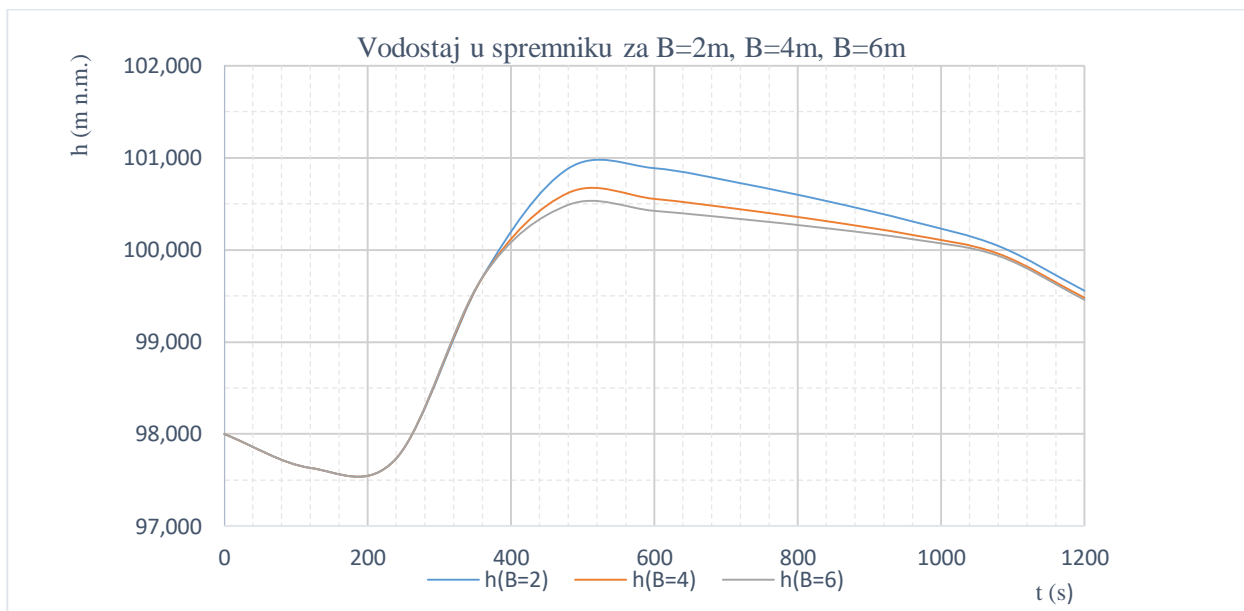
| t (s) | h (m n.m.) | $Q_0$ (m <sup>3</sup> /s) | $Q_p$ (m <sup>3</sup> /s) | $Q_1$ (m <sup>3</sup> /s) |
|-------|------------|---------------------------|---------------------------|---------------------------|
| 315   | 98,8777    | 7,925                     | 0,000                     | 3,237                     |
| 320   | 98,9731    | 7,900                     | 0,000                     | 3,254                     |
| 325   | 99,0674    | 7,875                     | 0,000                     | 3,271                     |
| 330   | 99,1607    | 7,850                     | 0,000                     | 3,288                     |
| 335   | 99,2530    | 7,825                     | 0,000                     | 3,305                     |
| 340   | 99,3443    | 7,800                     | 0,000                     | 3,321                     |
| 345   | 99,4345    | 7,775                     | 0,000                     | 3,337                     |
| 350   | 99,5238    | 7,750                     | 0,000                     | 3,353                     |
| 355   | 99,6121    | 7,725                     | 0,000                     | 3,368                     |
| 360   | 99,6995    | 7,700                     | 0,000                     | 3,384                     |
| 365   | 99,7858    | 7,675                     | 0,000                     | 3,399                     |
| 370   | 99,8713    | 7,650                     | 0,000                     | 3,413                     |
| 375   | 99,9557    | 7,625                     | 0,000                     | 3,428                     |
| 380   | 100,0385   | 7,600                     | 0,080                     | 3,442                     |
| 385   | 100,1162   | 7,575                     | 0,421                     | 3,456                     |
| 390   | 100,1853   | 7,550                     | 0,848                     | 3,467                     |
| 395   | 100,2450   | 7,525                     | 1,290                     | 3,478                     |
| 400   | 100,2955   | 7,500                     | 1,707                     | 3,486                     |
| 405   | 100,3373   | 7,475                     | 2,083                     | 3,493                     |
| 410   | 100,3715   | 7,450                     | 2,408                     | 3,499                     |
| 415   | 100,3992   | 7,425                     | 2,681                     | 3,504                     |
| 420   | 100,4213   | 7,400                     | 2,907                     | 3,507                     |
| 425   | 100,4388   | 7,375                     | 3,090                     | 3,510                     |
| 430   | 100,4525   | 7,350                     | 3,236                     | 3,513                     |
| 435   | 100,4630   | 7,325                     | 3,349                     | 3,514                     |
| 440   | 100,4710   | 7,300                     | 3,437                     | 3,516                     |
| 445   | 100,4770   | 7,275                     | 3,503                     | 3,517                     |
| 450   | 100,4814   | 7,250                     | 3,551                     | 3,517                     |
| 455   | 100,4844   | 7,225                     | 3,584                     | 3,518                     |
| 460   | 100,4864   | 7,200                     | 3,606                     | 3,518                     |
| 465   | 100,4875   | 7,175                     | 3,618                     | 3,519                     |
| 470   | 100,4880   | 7,150                     | 3,624                     | 3,519                     |
| 475   | 100,4879   | 7,125                     | 3,623                     | 3,519                     |
| 480   | 100,4874   | 7,100                     | 3,617                     | 3,518                     |
| 485   | 100,4865   | 7,075                     | 3,607                     | 3,518                     |
| 490   | 100,4854   | 7,050                     | 3,595                     | 3,518                     |
| 495   | 100,4840   | 7,025                     | 3,580                     | 3,518                     |
| 500   | 100,4825   | 7,000                     | 3,563                     | 3,518                     |
| 505   | 100,4807   | 6,963                     | 3,543                     | 3,517                     |
| 510   | 100,4786   | 6,925                     | 3,520                     | 3,517                     |
| 515   | 100,4763   | 6,888                     | 3,494                     | 3,517                     |
| 520   | 100,4738   | 6,850                     | 3,467                     | 3,516                     |
| 525   | 100,4710   | 6,813                     | 3,437                     | 3,516                     |
| 530   | 100,4682   | 6,775                     | 3,406                     | 3,515                     |
| 535   | 100,4653   | 6,738                     | 3,374                     | 3,515                     |
| 540   | 100,4622   | 6,700                     | 3,341                     | 3,514                     |
| 545   | 100,4591   | 6,663                     | 3,307                     | 3,514                     |
| 550   | 100,4559   | 6,625                     | 3,273                     | 3,513                     |
| 555   | 100,4527   | 6,588                     | 3,238                     | 3,513                     |
| 560   | 100,4495   | 6,550                     | 3,203                     | 3,512                     |
| 565   | 100,4462   | 6,513                     | 3,168                     | 3,512                     |
| 570   | 100,4428   | 6,475                     | 3,133                     | 3,511                     |
| 575   | 100,4395   | 6,438                     | 3,097                     | 3,510                     |
| 580   | 100,4361   | 6,400                     | 3,061                     | 3,510                     |
| 585   | 100,4327   | 6,363                     | 3,025                     | 3,509                     |
| 590   | 100,4292   | 6,325                     | 2,990                     | 3,509                     |
| 595   | 100,4258   | 6,288                     | 2,954                     | 3,508                     |
| 600   | 100,4223   | 6,250                     | 2,918                     | 3,508                     |
| 605   | 100,4188   | 6,213                     | 2,881                     | 3,507                     |
| 610   | 100,4153   | 6,175                     | 2,845                     | 3,506                     |
| 615   | 100,4118   | 6,138                     | 2,809                     | 3,506                     |
| 620   | 100,4083   | 6,100                     | 2,773                     | 3,505                     |
| 625   | 100,4047   | 6,063                     | 2,737                     | 3,505                     |
| 630   | 100,4011   | 6,025                     | 2,701                     | 3,504                     |

Tablica 3 - nastavak. Dotok  $Q_0$ , protok  $Q_I$  i preljevni protok  $Q_p$  za dužinu preljevnog praga  $B=6$  (m) u ovisnosti o vremenu  $t$

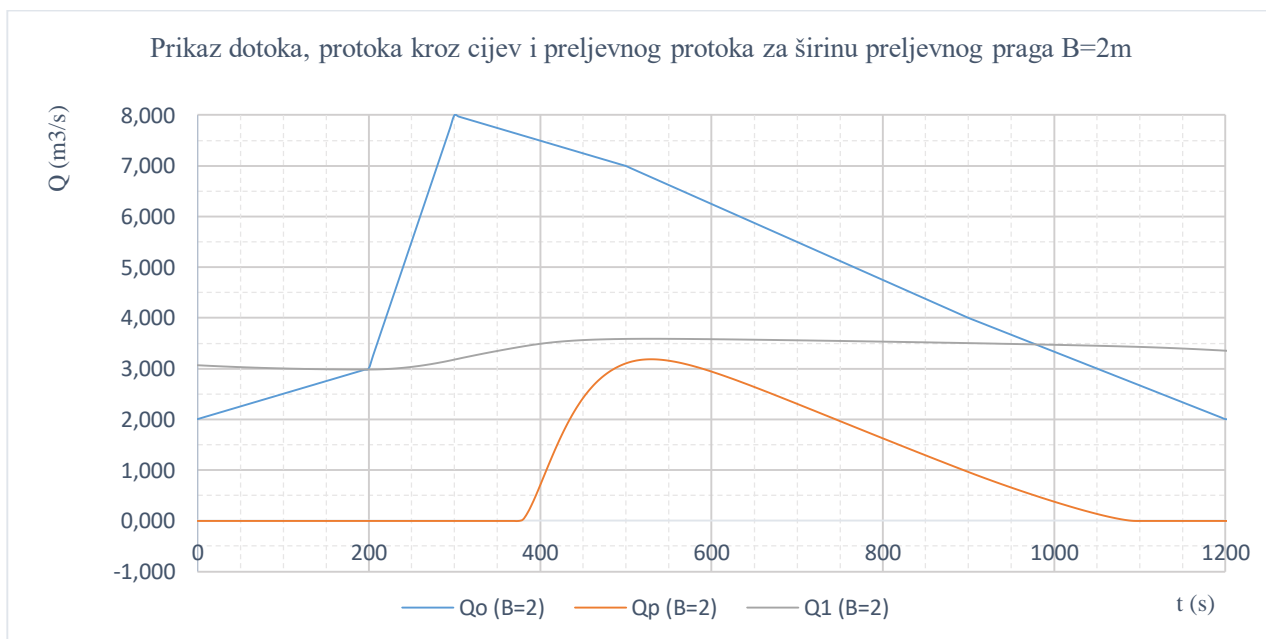
| t (s) | h (m n.m.) | $Q_0$ (m <sup>3</sup> /s) | $Q_p$ (m <sup>3</sup> /s) | $Q_I$ (m <sup>3</sup> /s) |
|-------|------------|---------------------------|---------------------------|---------------------------|
| 635   | 100,3976   | 5,988                     | 2,665                     | 3,503                     |
| 640   | 100,3940   | 5,950                     | 2,629                     | 3,503                     |
| 645   | 100,3903   | 5,913                     | 2,593                     | 3,502                     |
| 650   | 100,3867   | 5,875                     | 2,557                     | 3,502                     |
| 655   | 100,3831   | 5,838                     | 2,520                     | 3,501                     |
| 660   | 100,3794   | 5,800                     | 2,484                     | 3,500                     |
| 665   | 100,3757   | 5,763                     | 2,448                     | 3,500                     |
| 670   | 100,3720   | 5,725                     | 2,412                     | 3,499                     |
| 675   | 100,3683   | 5,688                     | 2,376                     | 3,498                     |
| 680   | 100,3646   | 5,650                     | 2,340                     | 3,498                     |
| 685   | 100,3608   | 5,613                     | 2,304                     | 3,497                     |
| 690   | 100,3571   | 5,575                     | 2,268                     | 3,497                     |
| 695   | 100,3533   | 5,538                     | 2,232                     | 3,496                     |
| 700   | 100,3495   | 5,500                     | 2,196                     | 3,495                     |
| 705   | 100,3457   | 5,463                     | 2,160                     | 3,495                     |
| 710   | 100,3418   | 5,425                     | 2,125                     | 3,494                     |
| 715   | 100,3380   | 5,388                     | 2,089                     | 3,493                     |
| 720   | 100,3341   | 5,350                     | 2,053                     | 3,493                     |
| 725   | 100,3302   | 5,313                     | 2,017                     | 3,492                     |
| 730   | 100,3263   | 5,275                     | 1,981                     | 3,491                     |
| 735   | 100,3223   | 5,238                     | 1,945                     | 3,491                     |
| 740   | 100,3184   | 5,200                     | 1,910                     | 3,490                     |
| 745   | 100,3144   | 5,163                     | 1,874                     | 3,489                     |
| 750   | 100,3104   | 5,125                     | 1,838                     | 3,489                     |
| 755   | 100,3063   | 5,088                     | 1,803                     | 3,488                     |
| 760   | 100,3023   | 5,050                     | 1,767                     | 3,487                     |
| 765   | 100,2982   | 5,013                     | 1,731                     | 3,487                     |
| 770   | 100,2941   | 4,975                     | 1,696                     | 3,486                     |
| 775   | 100,2900   | 4,938                     | 1,660                     | 3,485                     |
| 780   | 100,2858   | 4,900                     | 1,625                     | 3,484                     |
| 785   | 100,2817   | 4,863                     | 1,589                     | 3,484                     |
| 790   | 100,2775   | 4,825                     | 1,554                     | 3,483                     |
| 795   | 100,2732   | 4,788                     | 1,518                     | 3,482                     |
| 800   | 100,2690   | 4,750                     | 1,483                     | 3,482                     |
| 805   | 100,2647   | 4,713                     | 1,448                     | 3,481                     |
| 810   | 100,2604   | 4,675                     | 1,412                     | 3,480                     |
| 815   | 100,2560   | 4,638                     | 1,377                     | 3,479                     |
| 820   | 100,2516   | 4,600                     | 1,342                     | 3,479                     |
| 825   | 100,2472   | 4,563                     | 1,307                     | 3,478                     |
| 830   | 100,2428   | 4,525                     | 1,272                     | 3,477                     |
| 835   | 100,2383   | 4,488                     | 1,237                     | 3,476                     |
| 840   | 100,2338   | 4,450                     | 1,202                     | 3,476                     |
| 845   | 100,2292   | 4,413                     | 1,167                     | 3,475                     |
| 850   | 100,2247   | 4,375                     | 1,132                     | 3,474                     |
| 855   | 100,2200   | 4,338                     | 1,097                     | 3,473                     |
| 860   | 100,2154   | 4,300                     | 1,063                     | 3,473                     |
| 865   | 100,2107   | 4,263                     | 1,028                     | 3,472                     |
| 870   | 100,2059   | 4,225                     | 0,993                     | 3,471                     |
| 875   | 100,2011   | 4,188                     | 0,959                     | 3,470                     |
| 880   | 100,1963   | 4,150                     | 0,924                     | 3,469                     |
| 885   | 100,1914   | 4,113                     | 0,890                     | 3,468                     |
| 890   | 100,1865   | 4,075                     | 0,856                     | 3,468                     |
| 895   | 100,1815   | 4,038                     | 0,822                     | 3,467                     |
| 900   | 100,1765   | 4,000                     | 0,788                     | 3,466                     |
| 905   | 100,1714   | 3,967                     | 0,754                     | 3,465                     |
| 910   | 100,1664   | 3,933                     | 0,721                     | 3,464                     |
| 915   | 100,1613   | 3,900                     | 0,689                     | 3,463                     |
| 920   | 100,1563   | 3,867                     | 0,657                     | 3,462                     |
| 925   | 100,1512   | 3,833                     | 0,625                     | 3,462                     |
| 930   | 100,1462   | 3,800                     | 0,594                     | 3,461                     |
| 935   | 100,1411   | 3,767                     | 0,563                     | 3,460                     |
| 940   | 100,1359   | 3,733                     | 0,533                     | 3,459                     |
| 945   | 100,1308   | 3,700                     | 0,503                     | 3,458                     |
| 950   | 100,1255   | 3,667                     | 0,473                     | 3,457                     |
| 955   | 100,1202   | 3,633                     | 0,443                     | 3,456                     |
| 960   | 100,1149   | 3,600                     | 0,414                     | 3,455                     |
| 965   | 100,1095   | 3,567                     | 0,385                     | 3,454                     |
| 970   | 100,1040   | 3,533                     | 0,357                     | 3,454                     |

| t (s) | h (m n.m.) | $Q_0$ (m <sup>3</sup> /s) | $Q_p$ (m <sup>3</sup> /s) | $Q_I$ (m <sup>3</sup> /s) |
|-------|------------|---------------------------|---------------------------|---------------------------|
| 975   | 100,0984   | 3,500                     | 0,328                     | 3,453                     |
| 980   | 100,0928   | 3,467                     | 0,300                     | 3,452                     |
| 985   | 100,0870   | 3,433                     | 0,273                     | 3,451                     |
| 990   | 100,0812   | 3,400                     | 0,246                     | 3,450                     |
| 995   | 100,0752   | 3,367                     | 0,219                     | 3,449                     |
| 1000  | 100,0691   | 3,333                     | 0,193                     | 3,448                     |
| 1005  | 100,0629   | 3,300                     | 0,168                     | 3,446                     |
| 1010  | 100,0566   | 3,267                     | 0,143                     | 3,445                     |
| 1015  | 100,0501   | 3,233                     | 0,119                     | 3,444                     |
| 1020  | 100,0434   | 3,200                     | 0,096                     | 3,443                     |
| 1025  | 100,0365   | 3,167                     | 0,074                     | 3,442                     |
| 1030  | 100,0294   | 3,133                     | 0,054                     | 3,441                     |
| 1035  | 100,0220   | 3,100                     | 0,035                     | 3,439                     |
| 1040  | 100,0144   | 3,067                     | 0,018                     | 3,438                     |
| 1045  | 100,0064   | 3,033                     | 0,005                     | 3,437                     |
| 1050  | 99,9980    | 3,000                     | 0,000                     | 3,435                     |
| 1055  | 99,9889    | 2,967                     | 0,000                     | 3,434                     |
| 1060  | 99,9793    | 2,933                     | 0,000                     | 3,432                     |
| 1065  | 99,9690    | 2,900                     | 0,000                     | 3,430                     |
| 1070  | 99,9581    | 2,867                     | 0,000                     | 3,428                     |
| 1075  | 99,9465    | 2,833                     | 0,000                     | 3,426                     |
| 1080  | 99,9343    | 2,800                     | 0,000                     | 3,424                     |
| 1085  | 99,9215    | 2,767                     | 0,000                     | 3,422                     |
| 1090  | 99,9080    | 2,733                     | 0,000                     | 3,420                     |
| 1095  | 99,8940    | 2,700                     | 0,000                     | 3,417                     |
| 1100  | 99,8793    | 2,667                     | 0,000                     | 3,415                     |
| 1105  | 99,8640    | 2,633                     | 0,000                     | 3,412                     |
| 1110  | 99,8481    | 2,600                     | 0,000                     | 3,409                     |
| 1115  | 99,8315    | 2,567                     | 0,000                     | 3,407                     |
| 1120  | 99,8143    | 2,533                     | 0,000                     | 3,404                     |
| 1125  | 99,7966    | 2,500                     | 0,000                     | 3,401                     |
| 1130  | 99,7782    | 2,467                     | 0,000                     | 3,397                     |
| 1135  | 99,7592    | 2,433                     | 0,000                     | 3,394                     |
| 1140  | 99,7396    | 2,400                     | 0,000                     | 3,391                     |
| 1145  | 99,7193    | 2,367                     | 0,000                     | 3,387                     |
| 1150  | 99,6985    | 2,333                     | 0,000                     | 3,383                     |
| 1155  | 99,6771    | 2,300                     | 0,000                     | 3,380                     |
| 1160  | 99,6550    | 2,267                     | 0,000                     | 3,376                     |
| 1165  | 99,6324    | 2,233                     | 0,000                     | 3,372                     |
| 1170  | 99,6092    | 2,200                     | 0,000                     | 3,368                     |
| 1175  | 99,5853    | 2,167                     | 0,000                     | 3,364                     |
| 1180  | 99,5609    | 2,133                     | 0,000                     | 3,359                     |
| 1185  | 99,5359    | 2,100                     | 0,000                     | 3,355                     |
| 1190  | 99,5102    | 2,067                     | 0,000                     | 3,350                     |
| 1195  | 99,4840    | 2,033                     | 0,000                     | 3,346                     |
| 1200  | 99,4572    | 2,000                     | 0,000                     | 3,341                     |
| 1205  | 99,4301    | 2,000                     | 0,000                     | 3,336                     |
| 1210  | 99,4031    | 2,000                     | 0,000                     | 3,331                     |
| 1215  | 99,3762    | 2,000                     | 0,000                     | 3,327                     |
| 1220  | 99,3494    | 2,000                     | 0,000                     | 3,322                     |
| 1225  | 99,3226    | 2,000                     | 0,000                     | 3,317                     |
| 1230  | 99,2960    | 2,000                     | 0,000                     | 3,312                     |
| 1235  | 99,2694    | 2,000                     | 0,000                     | 3,308                     |
| 1240  | 99,2429    | 2,000                     | 0,000                     | 3,303                     |
| 1245  | 99,2165    | 2,000                     | 0,000                     | 3,298                     |
| 1250  | 99,1901    | 2,000                     | 0,000                     | 3,293                     |
| 1255  | 99,1639    | 2,000                     | 0,000                     | 3,289                     |
| 1260  | 99,1377    | 2,000                     | 0,000                     | 3,284                     |
| 1265  | 99,1116    | 2,000                     | 0,000                     | 3,279                     |
| 1270  | 99,0856    | 2,000                     | 0,000                     | 3,275                     |
| 1275  | 99,0597    | 2,000                     | 0,000                     | 3,270                     |
| 1280  | 99,0338    | 2,000                     | 0,000                     | 3,265                     |
| 1285  | 99,0081    | 2,000                     | 0,000                     | 3,261                     |
| 1290  | 98,9824    | 2,000                     | 0,000                     | 3,256                     |
| 1295  | 98,9568    | 2,000                     | 0,000                     | 3,251                     |
| 1300  | 98,9313    | 2,000                     | 0,000                     | 3,247                     |

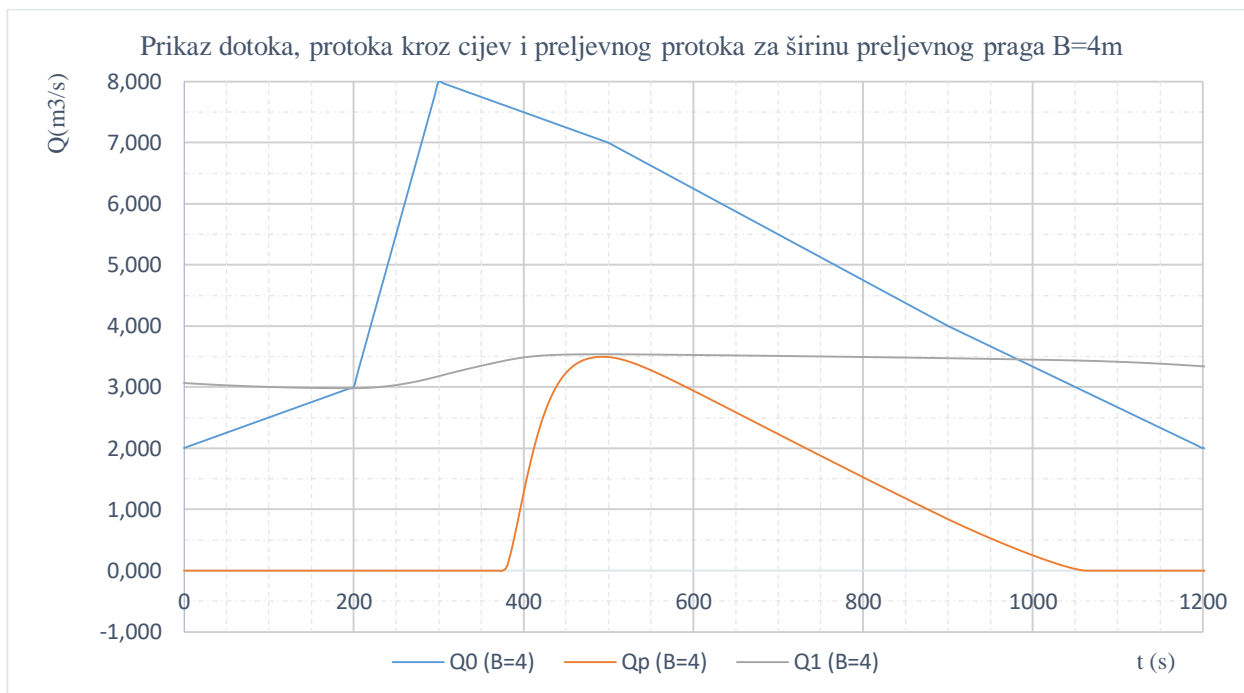
### 3.3. Grafički prikaz rezultata proračuna



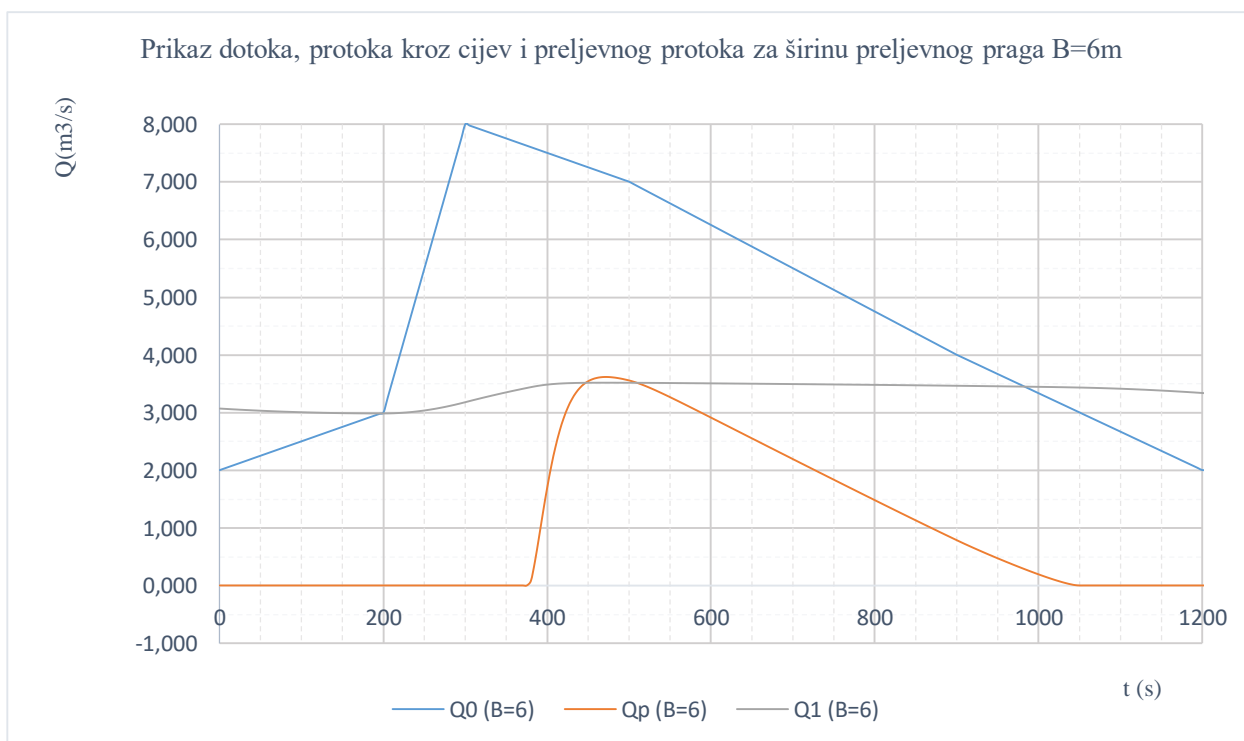
3.3.1. Prikaz vodostaja u spremniku za zadane širine preljevneog praga B u funkciji vremena t



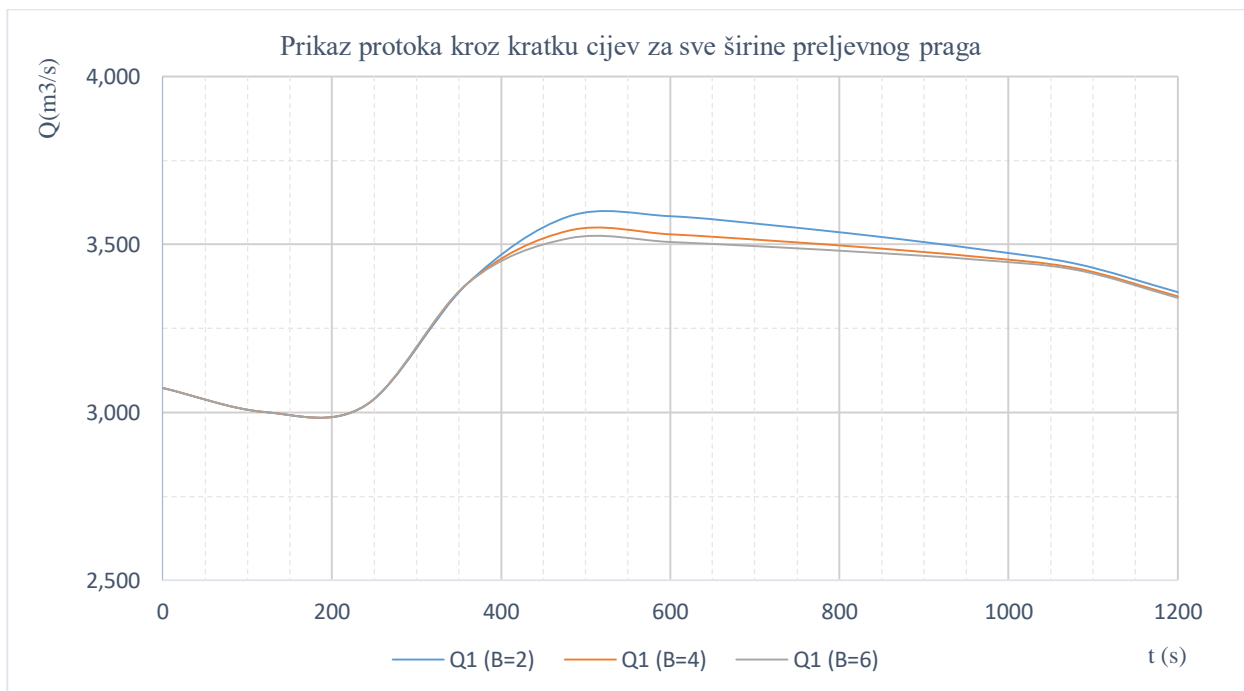
3.3.2. Prikaz dotoka  $Q_0$ , protoka  $Q_1$  i preljevneog protoka  $Q_p$  za širinu preljevneog praga B=2m u funkciji vremena t



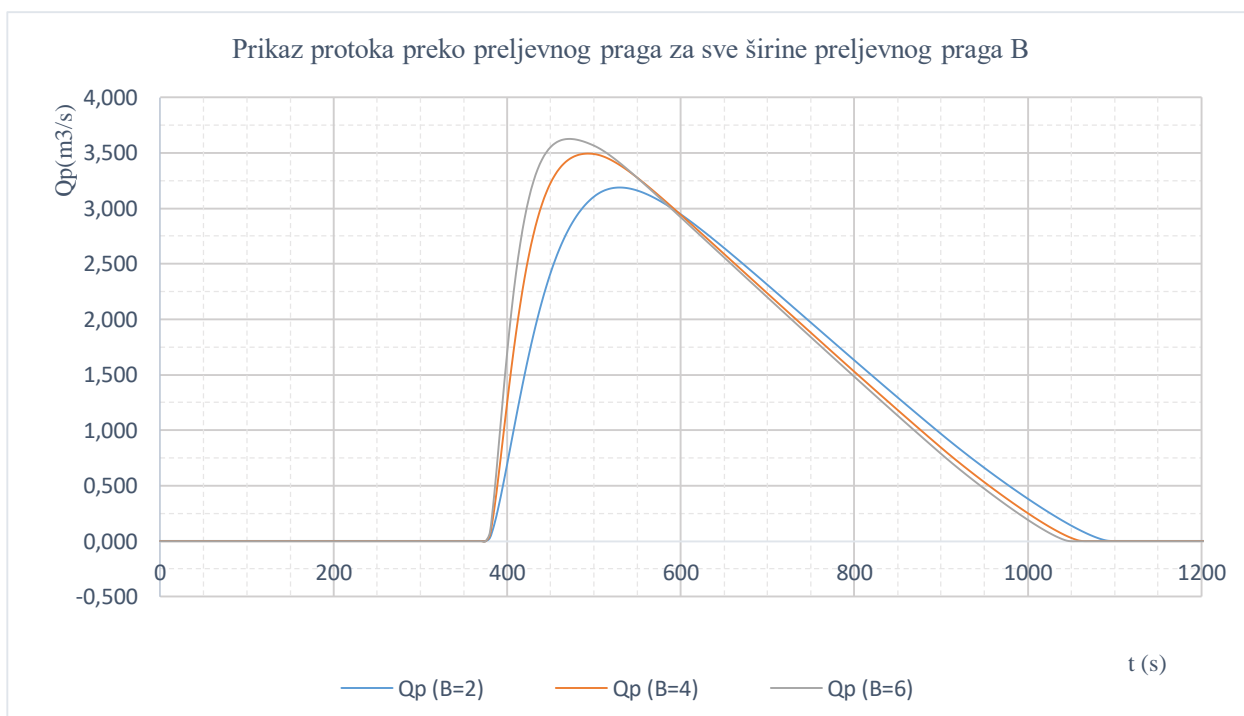
3.3.3. Prikaz dotoka  $Q_0$ , protoka  $Q_1$  i preljevnog protoka  $Q_p$  za širinu preljevnog praga  $B=4m$  u funkciji vremena  $t$



3.3.4. Prikaz dotoka  $Q_0$ , protoka  $Q_1$  i preljevnog protoka  $Q_p$  za širinu preljevnog praga  $B=6m$  u funkciji vremena  $t$



3.3.5. Prikaz protoka kroz kratku cijev  $Q_1$  za sve širine preljevnog praga ( $B=2m$ ,  $B=4m$ ,  $B=6m$ ) u funkciji vremena  $t$



3.3.6. Prikaz protoka preko preljevnog praga  $Q_p$  za sve zadane širine preljevnog praga ( $B_1=2m$ ,  $B_2=4m$ ,  $B_3=6m$ ) u funkciji vremena  $t$

#### 4. ZAKLJUČAK

Problem obrađen u ovom radu odnosi se na otvoreni vodospremnik čija je površina varijabilna u ovisnosti o vodostaju. Iz zadanih vrijednosti površine vodospremnika i dotoka, varijabilnog o vremenu izvršen je proračun protoka kroz cijev i preljevnog protoka za 3 varijante dužine preljevnog praga.

Iz grafičkog prikaza rezultata proračuna vidljivo je sljedeće:

- Iz dijagrama 3.3.1. vidljivo je kako je vodostaj vodospremnika dostiže najvišu vrijednost za najmanju dužinu preljevnog praga ( $B=2\text{m}$ )
- Iz dijagrama 3.3.2, 3.3.3. i 3.3.4. vidljivo je da su protok kroz cijev i preljevni protok varijabilni i to protok kroz cijev s blagim odstupanjima, a preljevni protok s drastičnim odstupanjima s obzirom na dužinu preljevnog praga  $B$
- Iz dijagrama 3.3.5. zaključujemo kako je vrijednost protoka kroz cijev nije varijabilna u ovisnosti o dužini preljevnog praga do točke prelijevanja, a kad vodostaj prijeđe točku prelijevanja vrijednost protoka kroz cijev varira obrnuto proporcionalno vrijednosti dužine preljevnog praga. Najveću vrijednost protoka kroz cijev dostiže za dužinu preljevnog praga  $B=2$  (m), a najmanju za  $B=6$  (m).
- Iz dijagrama 3.3.6. zaključujemo kako je trajanje prelijevanja vode preko preljevnog praga najduže trajalo za dužinu preljevnog praga  $B=2$  (m) (710 (s)), a kod preljevnih pragova  $B=4$  (m) (680 (s)) i  $B=6$  (m) je trajalo 665 (s).

## 5. LITERATURA

- V. Jović, Osnove hidromehanike, Element, 2006.