

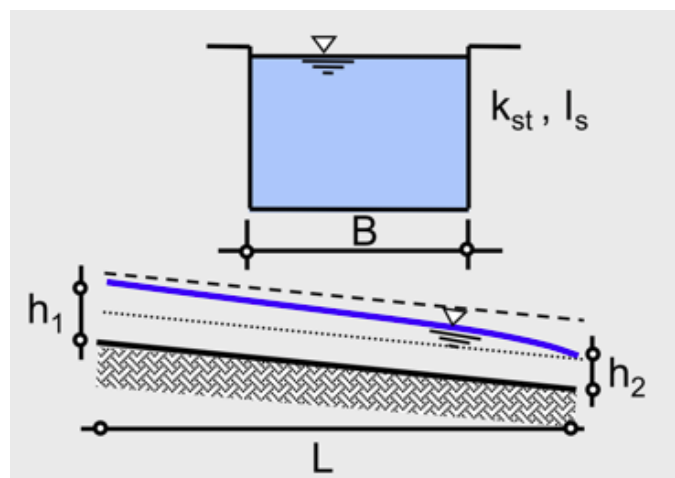
FLUME 1 – FRICTION, SINKING WATER LEVEL

DESCRIPTION

A single flume element with a sinking water level. The boundary condition (water level) at the system outlet is not given by the user.

Given:

- $Q = 1 \text{ m}^3/\text{s}$
- $h_2 = h_{gr}$ (critical flow depth)
- $I_s = 0.2 \%$ ($\Delta z = 0.2 \text{ m}$)
- $K_{st} = 75$
- $B = 1.0 \text{ m}$
- $L = 100.0 \text{ m}$

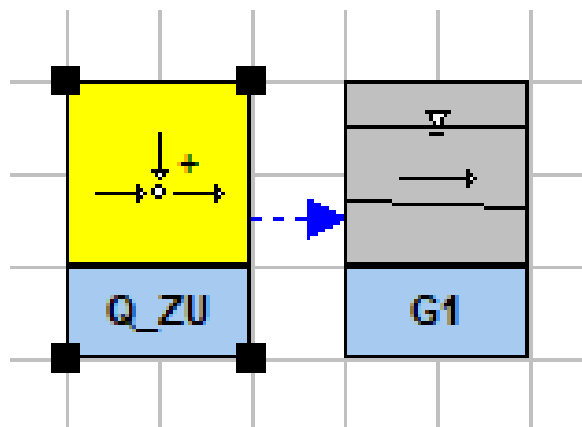


TASK

Determine the flow depth h_1 at the flume inlet and calculate the critical flow depth at h_2 .

SYSTEM ABSTRACTION IN HYBEKA

The system is very simple. To represent it, we only need a flow changer to represent the inflow into the flume and an open channel element for the flume itself.



DATA INPUT

General settings:

waterlevel at end of system [masl]

The water level at the system outlet is left empty.

Flow changer Qzu:

HYBEKA for windows input of data

HYBEKA Ergebnisse Plot

data in detail | system | geometry | hydraulic losses | count elements

system/flow path

description of element	element	inlet	outlet	division	Qin/Qout
Zufluss	Q_ZU		G1		1000,00

insert division-line elements of *.ERK file create *.TAU file no plotting

geometry

longitudinal section			losses		cross section			upstream	cross section			downstream
zo	zu	L	k	c	T	hs	h	B	T	hs	h	B
100,2			75		T		1	1				

adjust invert level

hydraulic losses

losses			coefficient		dimensions			comments
hve	Zeta1	Zeta2	μ	n(c)	T	h,D	Bu	Bo

number dist.
n a

zeta-table

Q_ZU

G1

order

flow path

element

*.PKL

check

A B D G M P Q R S T U V W Z find continue close

Notice: the value for zo is arbitrary. It was chosen in a manner that the lower end of the flume element would be at 100.

Flume element G1:

HYBEKA for windows input of data

HYBEKA Ergebnisse Plot

data in detail | system | geometry | hydraulic losses | count elements

system/flow path

description of element	element	inlet	outlet	division	Qin/Qout
Gerinne 1	G1	Q_ZU	ENDE		

insert division-line
 elements of *.ERK file
 create *.TAU file
 no plotting

geometry

longitudinal section			losses		cross section			upstream	cross section			downstream
zo	zu	L	k	c	T	hs	h	B	T	hs	h	B
100,2	100	100			T		1	1				

adjust invert level

hydraulic losses

losses			coefficient		dimensions				comments
hve	Zeta1	Zeta2	μ	n(c)	T	h,D	Bu	Bo	

number dist. n a

zeta-table

Q_ZU

G1

order

flow path

element

*.PKL

check

A B D G M P Q R S T U V W Z

find continue

close

RESULTS:

i	element	Q	discharge [m³/s]	length [m]	invert [masl]	board level [m]	water level		wetted cross-section [m²]	velocity [m³/s]	energy level [masl]	shear stress [N/m²]	Pr o/g	losses [m]				comment	
							[m]	[masl]						frict.	single (1)	single (2)	transit.		
▶ 1	Q_ZU	1	1,000	0,000	100,200	1,000	0,661	100,861	0,66	1,51	100,978	6,07	o					0,000	
1	G1	1	1,000		100,200	1,000	0,661	100,861	0,66	1,51	100,978	6,07	o	0,266	0,000				V
2	G1	1		100,000	100,000	1,000	0,467	100,467	0,47	2,14	100,701	12,83	o					0,000	gr V

The water level at h_1 is 0.661 m. The critical flow depth at h_2 is 0.467 m.