

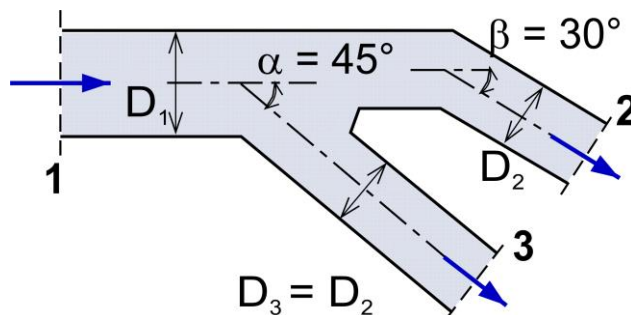
11th exercise

Force effects of stream and jet

11.1.

Flowing water acts on horizontal divider pipeline (see attached figure) by force F . Determine magnitude and direction of this force when discharge $Q_1 = 24 \text{ m}^3\text{s}^{-1}$. Diameters of the pipeline are $D_1 = 2,5 \text{ m}$, $D_2 = D_3 = 1,8 \text{ m}$. Discharge in profile 2 is $Q_2 = \frac{Q_1}{3}$ and overpressure in profile 2 is $p_{p2} = 340 \text{ kPa}$.

Neglect loss of energy.



(Result: $F = 1130,3 \text{ kN}$, $\omega = 72,59^\circ$)

11.2.

A policeman is dispersing demonstrators using water gun. Determine the force in which a jet from the water gun acts on standing demonstrator and on demonstrator running away from the policeman with velocity 15 km/hour . Diameter of water jet is 23 mm , discharge from the jet nozzle is 8 l/hour . Assume that demonstrators with flat backs are in perpendicular position to the policeman.

(Result: $F_1 = 154,0 \text{ N}$, $F_2 = 94,6 \text{ N}$)