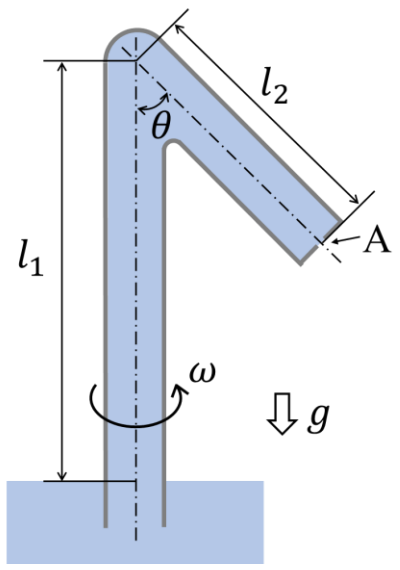
(Ⅰ).

Consider the case that one of the edges of the bent glass shown in the figure is vertically put under the free surface of water, and the other edge (point A) has a small hole. The hole is open to the atmosphere, and the cross-sectional area of the small hole is assumed to be sufficiently smaller than the cross-sectional area of the glass tube. When the bent glass is fully filled with water, and then the glass tube is rotated around its vertical axis with a sufficiently high angular velocity ω, water is ejected from the small hole to the atmosphere. Express the ejection velocity v from the small hole in the absolute frame, using ω, l_1, l_2, θ, and gravitational acceleration g. Note that the thickness of the small hole is sufficiently thin.
(25points)



(Ⅱ).

As shown in the figure, a two-dimensional water jet impinges a fixed inclined plate in the atmosphere. After the impingement, the water flow splits into upward and downward directions and detaches from the plate at the edges. The angle of inclination of the flat plate against the initial jet direction is θ, the density of water is ρ, and the velocity and width of the initial jet are V and B respectively. Neglecting gravitational effects and any flow friction loss, answer the following questions. (25 points)

(1) Find the x and y components of the force F in unit depth, acting on the inclined plate, using ρ, θ, V, and B.

(2) Find the volumetric flow rates distributed upward and downward Q_1 and Q_2 in unit depth using B, V, and θ.