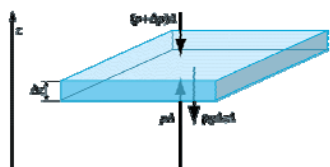


静水圧



$$\Delta p = -\rho g \Delta z$$

$$\frac{dp}{dz} = -\rho g$$

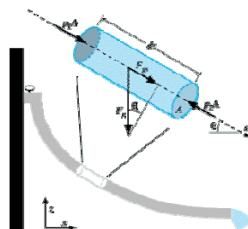
$$\int_p^{p_s} dp = -\rho g \int_{-d}^0 dz$$

$$p = \rho g d$$

ベルヌイの定理

$$(1) ma = (\rho dsA)a = \rho dsAu \frac{du}{ds}$$

$$a = \frac{du}{dt} = \frac{\partial u}{\partial t} + \frac{\partial u}{\partial s} \frac{ds}{dt} = u \frac{du}{ds}$$



$$(2) F_p = -\frac{dp}{ds} dsA$$

$$(3) F_{gs} = -\frac{dz}{ds} \rho g dsA$$

$$(1) = (2) + (3)$$

$$u \frac{du}{ds} + g \frac{dz}{ds} + \frac{1}{\rho} \frac{dp}{ds} = 0$$

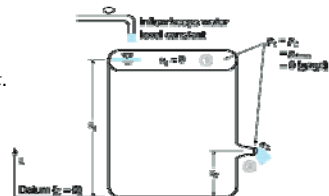
$$\frac{1}{ds} \left(\frac{u^2}{2g} + z + \frac{p}{\rho g} \right) = 0$$

$$u \frac{du}{ds} = \frac{1}{2} \frac{d(u^2)}{ds}$$

$$\frac{u^2}{2g} + z + \frac{p}{\rho g} = const.$$

× mg

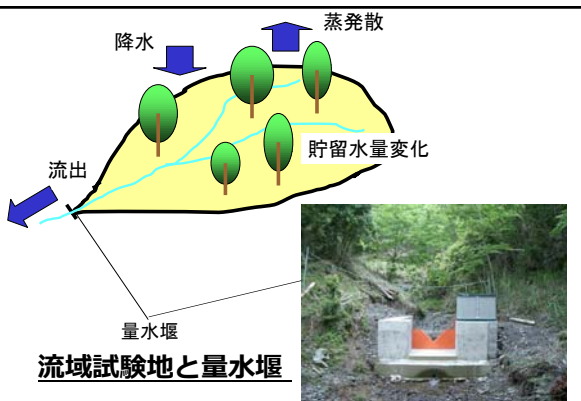
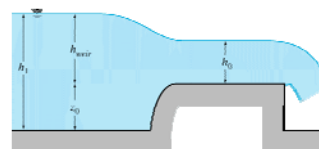
$$\frac{1}{2} \rho u^2 + \rho g z + p = const.$$



ベルヌイの定理の応用

- 渓流流速
- 水位 - 流量関係
- :

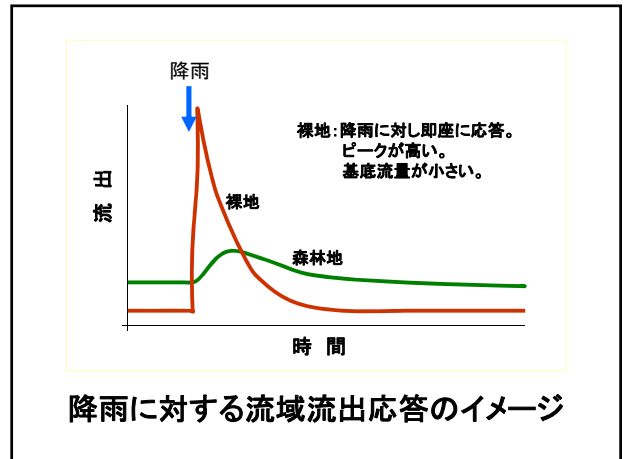
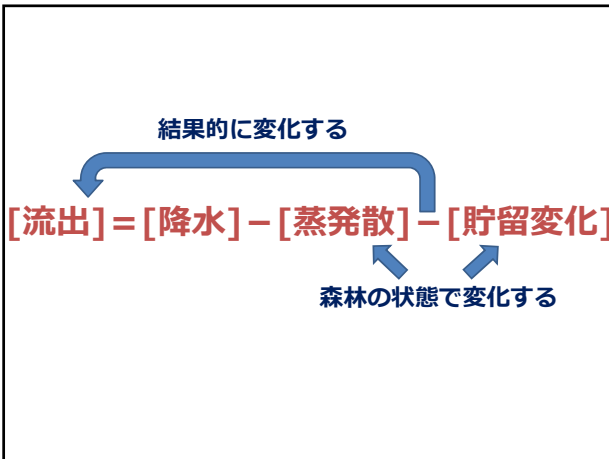
エネルギー損失、
層流 ⇔ 乱流、常流 ⇔ 射流



$$[流出] = [降水] - [蒸発散] - [貯留水量変化]$$



流域試験地：流出観測点



降雨に対する流域流出応答のイメージ

