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$$\rho\left(\frac{\partial \mathbf{u}}{\partial t} + (\mathbf{u} \cdot \nabla) \mathbf{u}\right) = -\nabla p + \mu \nabla^2 \mathbf{u} + \rho \mathbf{g}$$

1 2d

$$\frac{\partial h}{\partial t} = \frac{1}{3} \nabla (h^3 \nabla h) \tag{1}$$

$$\int_{\mathbb{R}} h \, \mathrm{d} x \tag{2}$$

$$h(x,t) = t^\alpha f(\eta) \text{ where } \eta = xt^{-\beta}$$

$$\alpha = -1/5 \quad \beta = 1/5$$

$$\frac{-3}{5}(\eta f' + f) = (f^3 f)'$$

$$f = \left(\frac{9}{10}\right)^{1/3} (\eta_*^2 - \eta^2)^{1/3}$$

$$\eta_* = \left(\frac{6075 \Gamma^6(\frac{2}{3}) \Gamma^6(\frac{11}{6})}{16 \pi^9}\right)^{1/10}$$

$$\approx 0.747412$$

2 Polar

$$\text{solve (1) and (2) in polar}$$

$$\alpha = -1/4 \quad \beta = 1/8$$

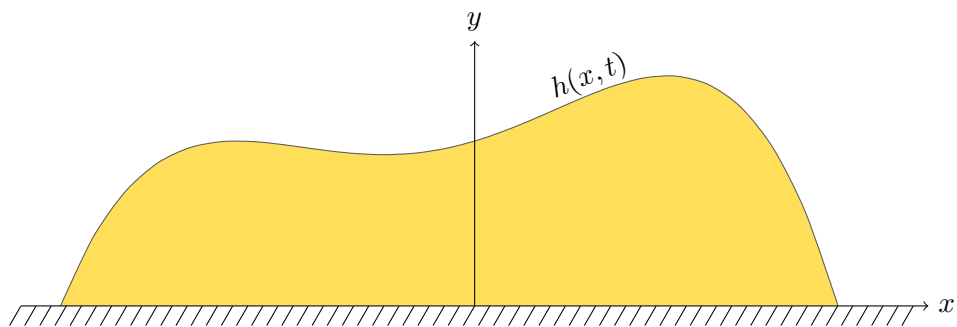


Figure 1: Beer spilled on a table.

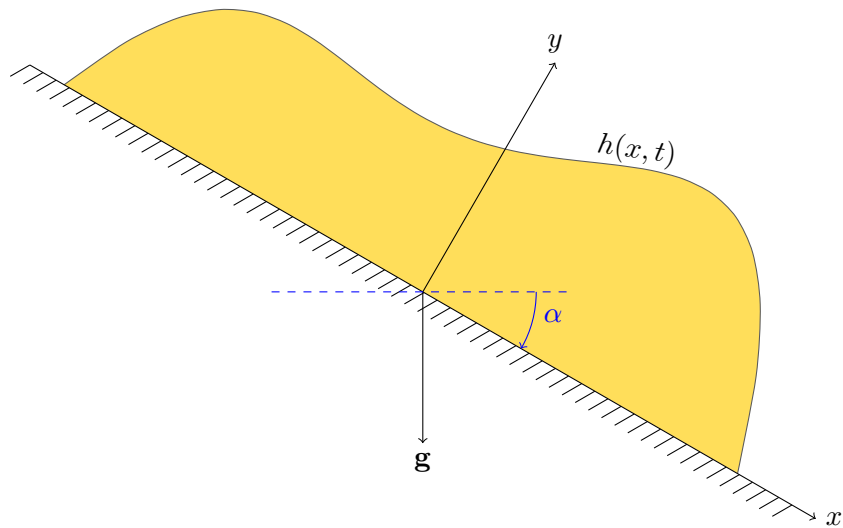


Figure 2: Beer spilled on a crooked table.

$$\frac{-3}{8}(2\eta f + \eta^2 f') = (\eta f^3 f')'$$

$$f = \left(\frac{9}{16}\right)^{1/3} (\eta_*^2 - \eta^2)^{1/3}$$

$$\eta_* = \left(\frac{1024}{243\pi^3}\right)^{1/8}$$

$$\approx 0.779212$$