1. The velocity at the first cross section is

$$v_1 = \frac{Q}{7.854 \cdot 10^{-3}\ \mathrm{m}^2}.$$

The velocity at the second cross section is

$$v_2 = \frac{4Q}{\pi d^2}.$$

Due to Bernoulli's law,

$$v_1^2 - v_2^2 = 2g\Delta h = 3.92\ \mathrm{m}^2/\mathrm{s}^2.$$

By substituting the velocities, we get

$$Q^2 \left(10^4\ \mathrm{m}^{-4} + \frac{1}{d^4}\right) = 2.418\ \mathrm{m}^2/\mathrm{s}^2,$$

which implies

$$Q = \sqrt{2.418\ \mathrm{m}^2/\mathrm{s}^2 \cdot \left(10^4\ \mathrm{m}^{-4} + \frac{1}{d^4}\right)^{-1}}.$$

2. The potential energy of a mass m on such a planet on a height h is

$$W(h) = mh\left(g_0 - \frac{\alpha h}{2}\right).$$

The the Bernoulli equation looks like

$$p + \frac{\rho v^2}{2} + \rho h\left(g_0 - \frac{\alpha h}{2}\right).$$

3. The air masses move circumferentially under the influence of the pressure gradient. If the velocity pattern is $v(r)$, then the Newton's law states

$$\frac{\rho v^2}{r} = \frac{dp}{dr}.$$

It's natural to assume that the Bernoulli's law works for all the range of r, although it's a controversial issue. If it's true then

$$p + \frac{\rho v^2}{2} = const.$$

Differentiation yields

$$\frac{dp}{dr} + \rho v\frac{dv}{dr} = 0.$$

Comparing this equation with the Newton's, we get

$$\frac{dv}{v} = -\frac{dr}{r},$$

which solution is

$$v(r) \propto r^{-1},$$

or

$$v(r) = v_0 \frac{r_0}{r},$$

where v_0 and r_0 are some constants. As it can be seen, this solution is absurd in the range of small r, that happens because Bernoulli's law works bad for big velocities (actually, it works bad everywhere, the truth is that it's *never* true). Maybe, a better solution would be obtained from the Navier-Stokes equation.