Theme Music: Pearl Jam

Even Flow

Cartoon: Randall Munroe

xkcd

\[ Q = A \sqrt{2gd} \]

- \textit{Q = flow rate}
- \textit{A = area of opening}
- \textit{d = ocean depth (2 km)}
- \textit{g = earth gravity}

Flow: \(\sim 400,000\) liters/s

Water jet velocity: \(\sim 200\) m/s

\begin{quote}
THE WHITE WITCH DIDN'T KNOW WHAT HIT HER.
\end{quote}
The Equation of the Day

Incompressible flow

$$A_1 v_1 = A_2 v_2$$
Foothold ideas: Buoyancy

■ **Archimedes’ principle:**
When an object is immersed in a fluid (in gravity), the result of the fluid’s pressure variation with depth is an upward force on the object equal to the weight of the water that would have been there if the object were not.

■ As a result, an object less dense than the fluid will float, one denser than the fluid will sink.

■ An object less dense than the fluid floats with a fraction of its volume under the fluid equal to \( \frac{\rho_{\text{object}}}{\rho_{\text{fluid}}} \).