

Continuity & Energy

Civil Engineering

Continuity and energy, stated once.

Mass is conserved along a stream tube, and total head is conserved unless something removes it.

$$Q = A_1 v_1 = A_2 v_2 \cdot H = z + p/\gamma + v^2/2g$$

Area halves

Continuity alone.

Velocity doubles

Velocity rises

Energy trades over.

Pressure head falls

A real pipe run

Losses are real.

Subtract hf downstream

THE COMMON MISTAKE

✗ **Applying Bernoulli across a pump**

✓ **Add the pump head as a term**

Bernoulli holds along a streamline with no work done and no loss. A pump, a turbine or a hydraulic jump each breaks that assumption.

Educational reference. Continuity and energy are the frame; a real system needs loss terms and a design standard.