Bernoulli's Equation

Mechanical Engineering

Pressure, velocity and elevation heads trading against each other.

Along a streamline in ideal flow, pressure head, velocity head and elevation add to a constant.

$$p \div \rho g + V^2 \div 2g + z = \text{constant}$$

Venturi throat Heads trade over.	**Faster, so lower pressure**
Pitot tube Stagnation minus static.	$\Delta p = \frac{1}{2}\rho V^2$
Tank orifice, head h Torricelli's result.	$V = \sqrt{(2gh)}$

THE COMMON MISTAKE

× Applying it across a pump or a valve

✓ Only where nothing is added or lost

Bernoulli assumes inviscid, steady, incompressible flow with no shaft work. Across a pump or a throttle, use the energy equation with loss terms.

Add pump head and friction head and Bernoulli becomes the steady-flow energy equation for a pipeline.