

Subcritical vs Supercritical

Civil Engineering

Two flow regimes, and where control sits.

Subcritical

- Froude number below 1
- Deep and slow, tranquil flow
- Control lies downstream of the reach
- Disturbances travel back upstream
- Most rivers, most of the time

Supercritical

- Froude number above 1
- Shallow and fast, shooting flow
- Control lies upstream of the reach
- Nothing propagates back upstream
- Steep chutes, spillways, below gates

THE DIFFERENCE THAT MATTERS

A hydraulic jump is how supercritical flow gets back to subcritical, shedding energy.

Educational reference. $Fr = v/\sqrt{gy}$. Channel and energy dissipator design follows the governing hydraulic standard.