

Modeling Pumped-Hydroelectric Nuclear Energy Storage

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Introduction

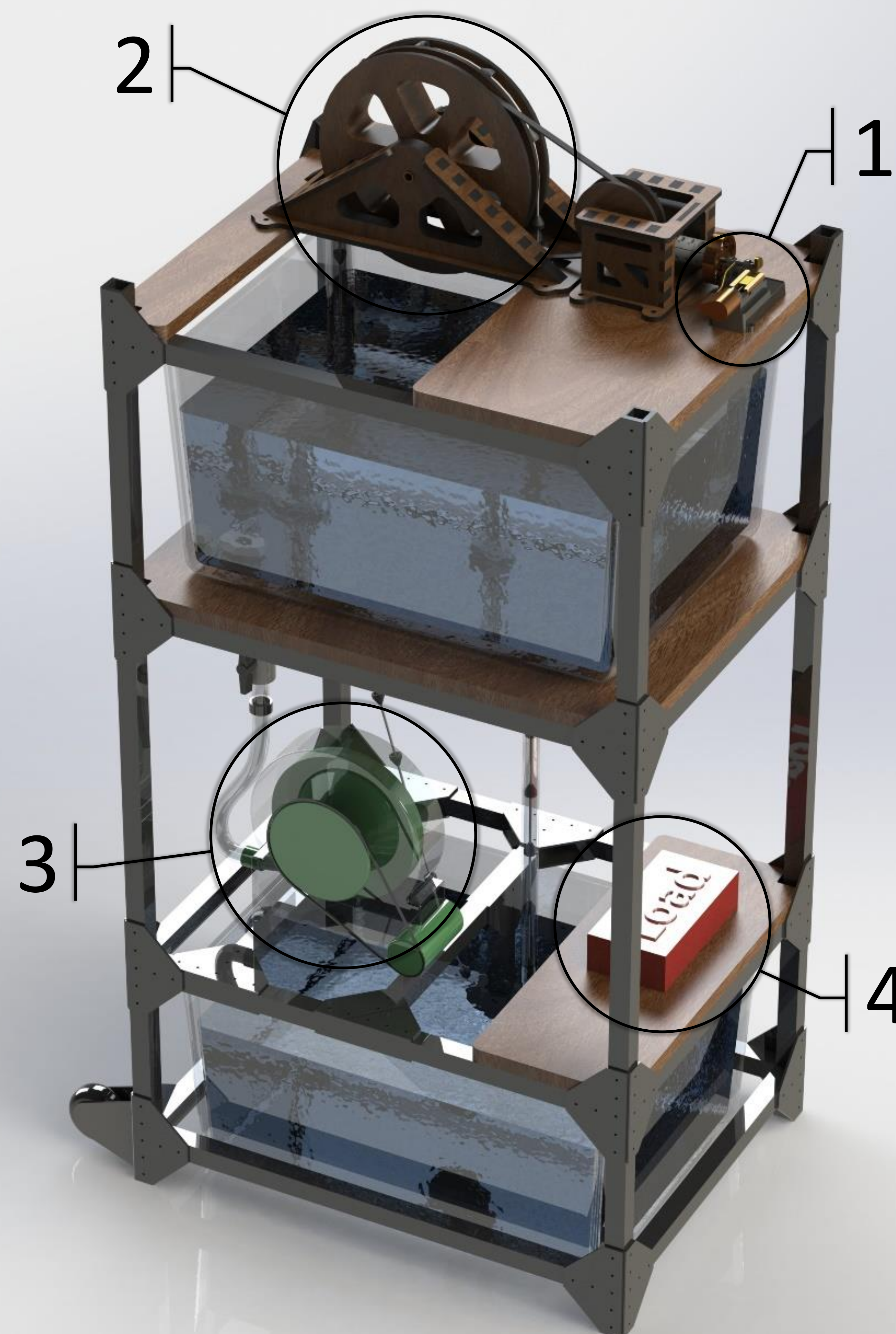
Nuclear power plants suffer from an inability to vary power output to meet fluctuating demand. Thus, multiple power storage technologies exist.

Definition

Pumped-hydroelectricity is one such energy storage system. Power is retained in the gravitational potential energy of water pumped into a high reservoir.

Result

We present a functional system model in order to demonstrate the fundamental concepts of pumped-hydroelectricity.



1 · Steam Engine

This engine (analogous to a true nuclear plant) generates up to 15 W of power while spinning at 2000 RPM.

2 · Rope Pump

A pump, coupled to the engine with a 1:45 gear transmission, raises water at up to 0.5 kg/s to a reservoir.

3 · Turbine & Generator

A Pelton wheel converts water kinetic energy to 12V AC electric current at nearly 1 W.

4 · Load

The current, once rectified, drives a microcontroller and speaker to audibly demonstrate power recovery.