CALIFORNIA STATE SCIENCE FAIR
2013 PROJECT SUMMARY

Name(s)
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Project Number
J0119

Project Title
Science in the Sink

Abstract

Objectives/Goals
The purpose of this project was to determine what factors affect the radius of the ring that forms in a sink when a stream of water from the faucet hits it. This ring is called the hydraulic jump.

Methods/Materials
The effect of varying flow rates was tested by running water through a nozzle at a fixed height with 10 different flow rates, measuring the size of the ring for each rate. The effect of a fixed flow rate from varying heights was tested by using a constant head device to create a fixed flow rate and measuring the ring size at 11 different heights.

Results
It was determined that one of the main factors affecting the radius of the hydraulic jump is the flow rate. As the flow rate increases the radius of the hydraulic jump increases in a linear relationship. As the height of the nozzle is increased, the jump radius increases roughly in proportion to the square-root of the nozzle height. Both of these relationships can be explained using simple mathematical models that were developed in analyzing the experimental results.

Conclusions/Discussion
From my research I learned about the energy of the jump and what causes the water to stop at the jump edge. I found it interesting that by using a simple mathematical model of the hydraulic jump, scientists can understand real-world phenomena such as the white hole and the solar wind terminal shock.

Summary Statement
Studying the factors affecting the shape of the hydraulic jump that forms when a stream of water from a kitchen faucet hits the sink.

Help Received
I had some assistance from my Dad. He helped me set up the equipment and he helped me understand some of the math.