Effect of Surface Deformations on the Hydraulic Jump

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The hydraulic jump is a complex, yet familiar phenomenon of fluid dynamics. It exists in both household and larger settings, appearing anywhere from kitchen sinks to the outfalls of dams. This experiment studied the impact of five unique surface deformations on the stationary hydraulic jump's radius. Each shape was made in four different sizes, and secured directly under the jet of water to a glass sheet. The hydraulic jump was filmed from a bird's eye view, and the footage was analyzed using ?Tracker software. After graphing the data for all five shapes, it was determined that both the shape and size of the surface deformation have a direct impact on the size and shape of the consequential hydraulic jump. Results of the experiment show an inverse linear relationship between shape radius and jump radius. With a better understanding of hydraulic jumps on imperfect surfaces, the repercussions of hydraulic jumps in nature can be better understood and predicted. Through future research, a stronger grasp on the effect of surface deformation on hydraulic jump radius, specifically in relation to viscosity, drop height, and flow rate, can be found.

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