# Graduate Student Research Seminar

## Spring 2022

## Corner singularities in polygonal hydraulic jumps

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**Monday, April 18th**

**3:00 pm (EST) – 132 Fluor Daniel Building**

## Abstract

A stream of liquid jet hitting on a flat solid plate spreads outwards and abruptly changes height at a critical distance away from the jet nozzle. This results in a stationary circular flow structure known as a hydraulic jump and can be observed in a kitchen sink. Under certain experimental conditions, one can also observe a symmetry breaking phenomena in circular jumps where steady polygon-like shapes appear. These conditions determine the surface and body forces on the liquid, and include the incoming flow rate, plate radius, and size of downstream weirs. Previous experiments have shown that changing these parameters can modify the overall size and number of sides of the polygonal jumps over a wide range. In this current work we focus on the region close to the corner of the polygons and observe a remarkable singularity arising there. We find that the local shape in the corner remains nearly constant with change in the polygonal sides, if the experimental setup is fixed. We show that these nearly universal shapes can be expressed through a scaling law that is followed by various other free surface cusps formed in viscous fluids.

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