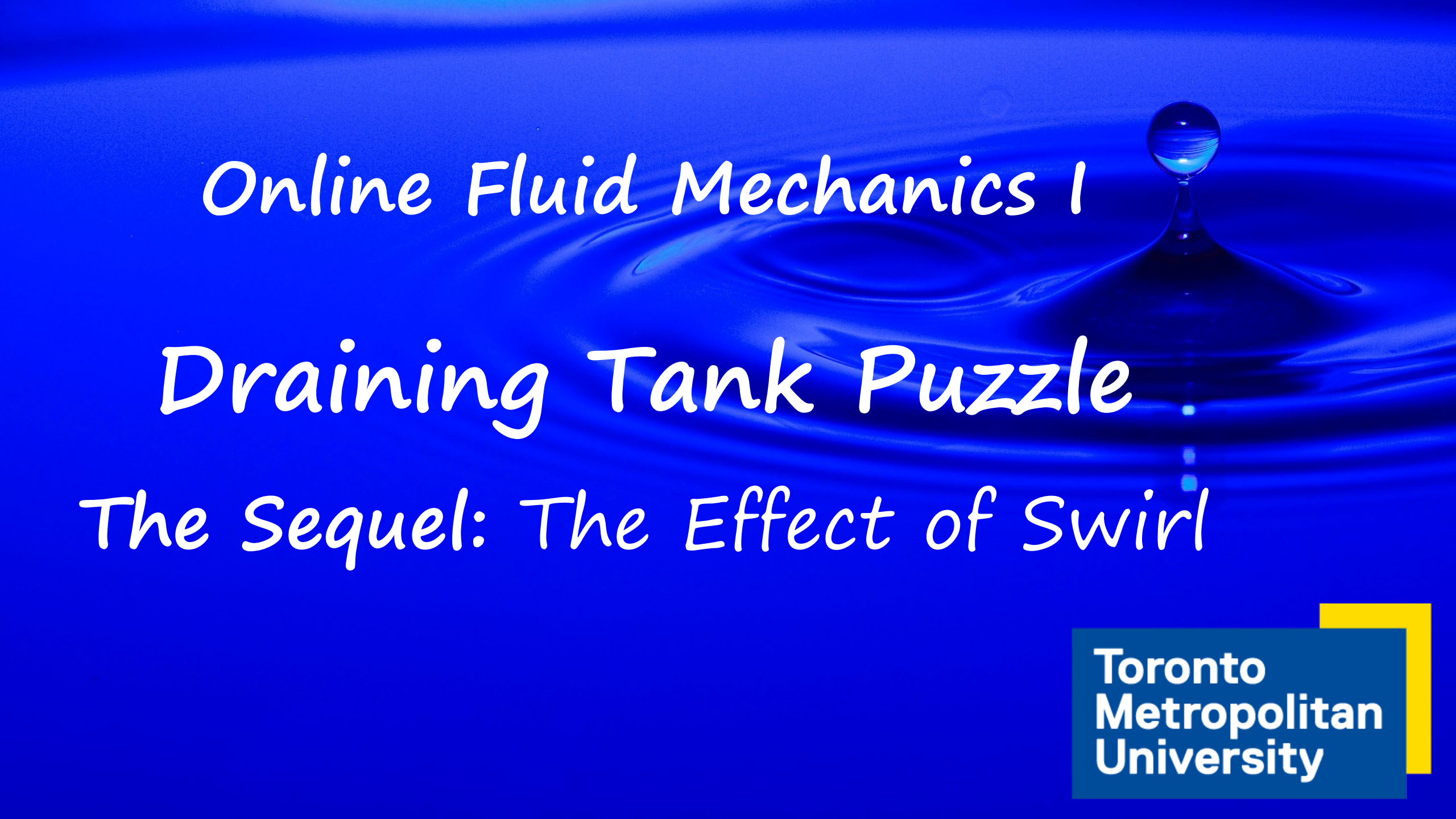
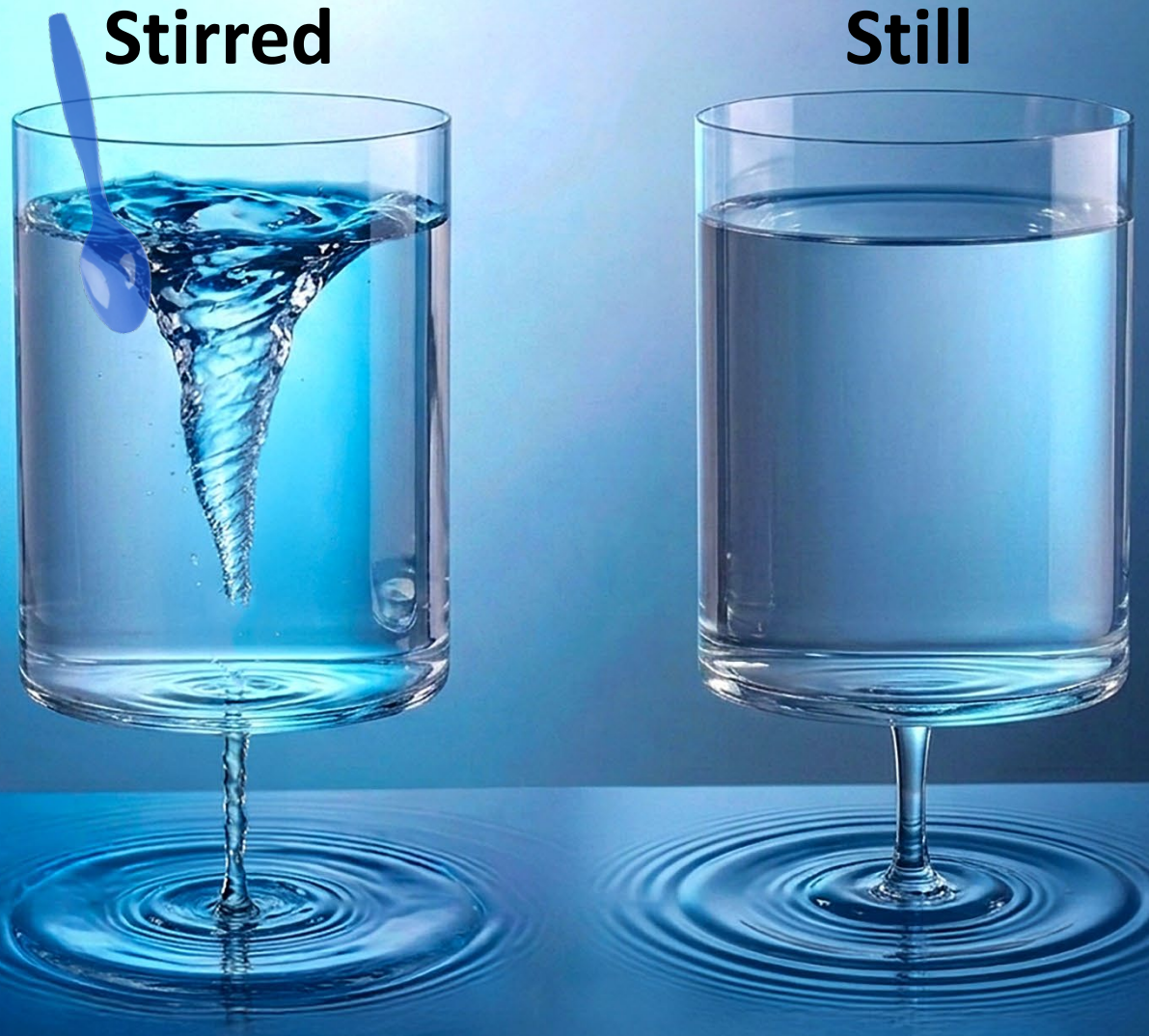

Online Fluid Mechanics I
Draining Tank Puzzle
The Sequel: The Effect of Swirl
Toronto Metropolitan University

Fluid Mechanics Puzzle:

Consider two draining tanks:

- Same total volume of water
- Same starting depth
- *Tank A is stirred*
- *Tank B is still*

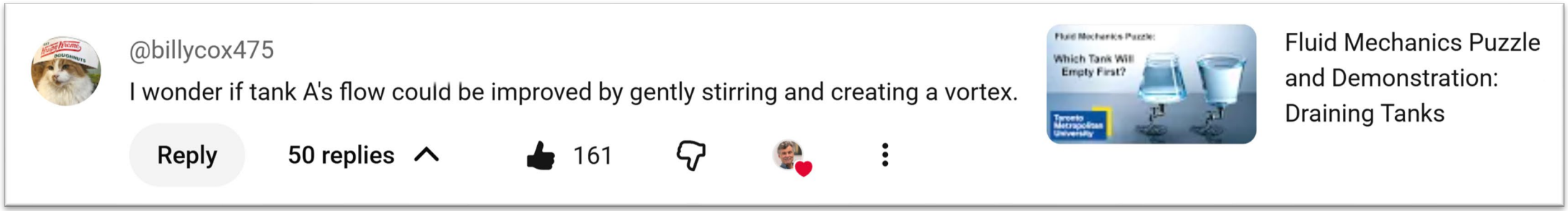


Which Tank Will Empty First?

☐ Stirred Tank (even gently)
☐ Still Tank
☐ Both Same

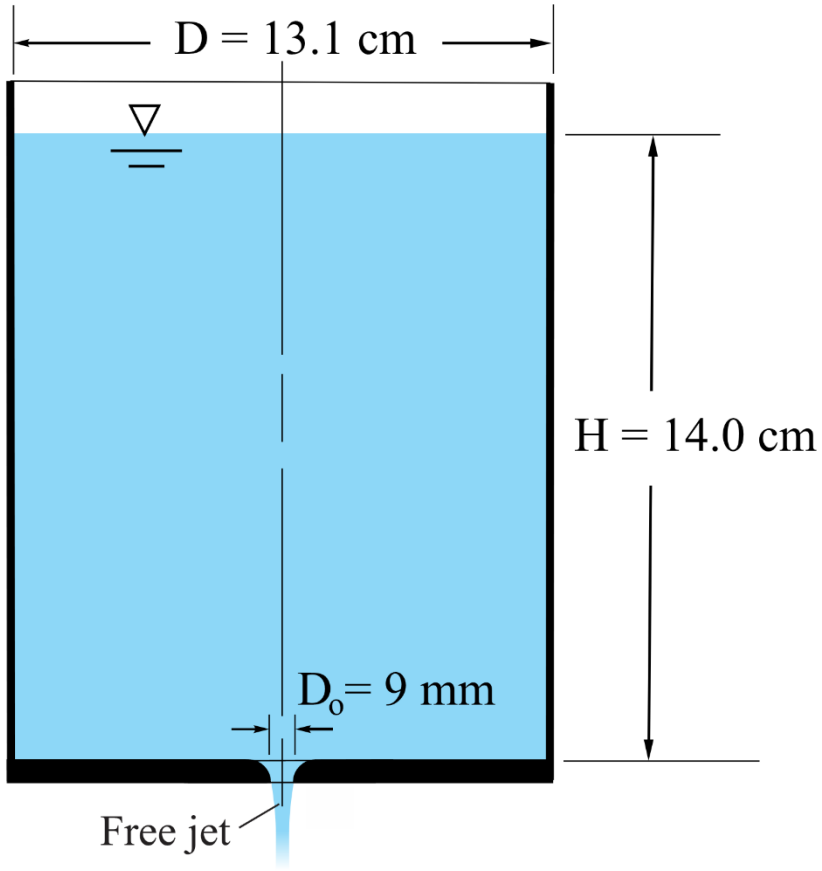
Draining Tank Puzzle: The Sequel

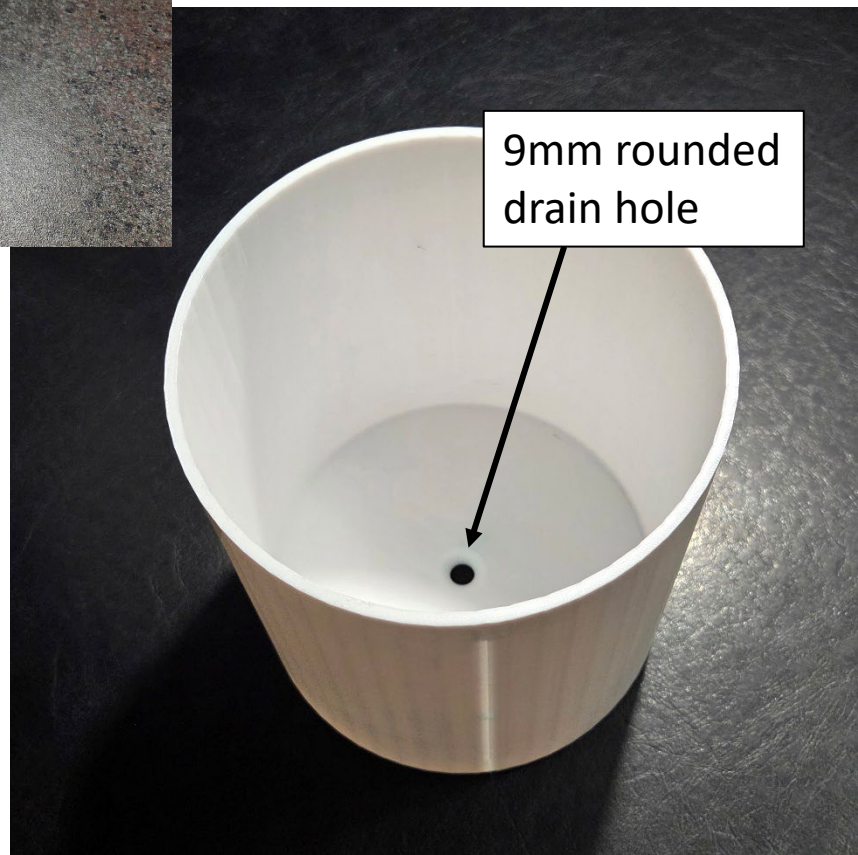
- Demonstration was a suggestion in the comments



Draining Tank Puzzle

- Demonstration with a 3-D printed tank

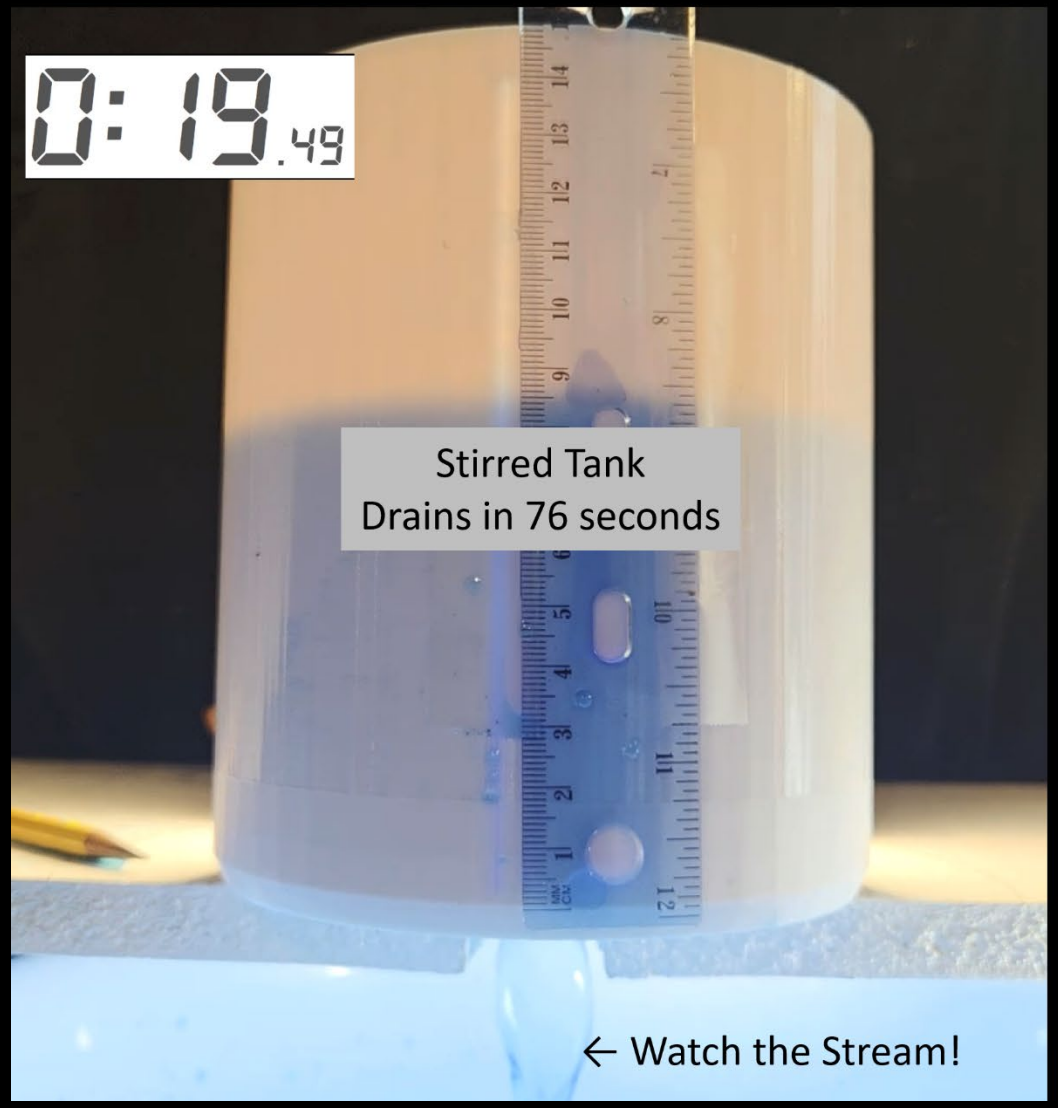




Draining Tank Puzzle

- Gentle stir with a pencil (~1 rev/sec)

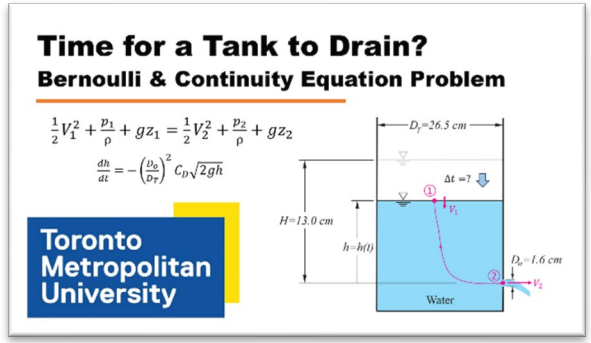
Stirred Tank

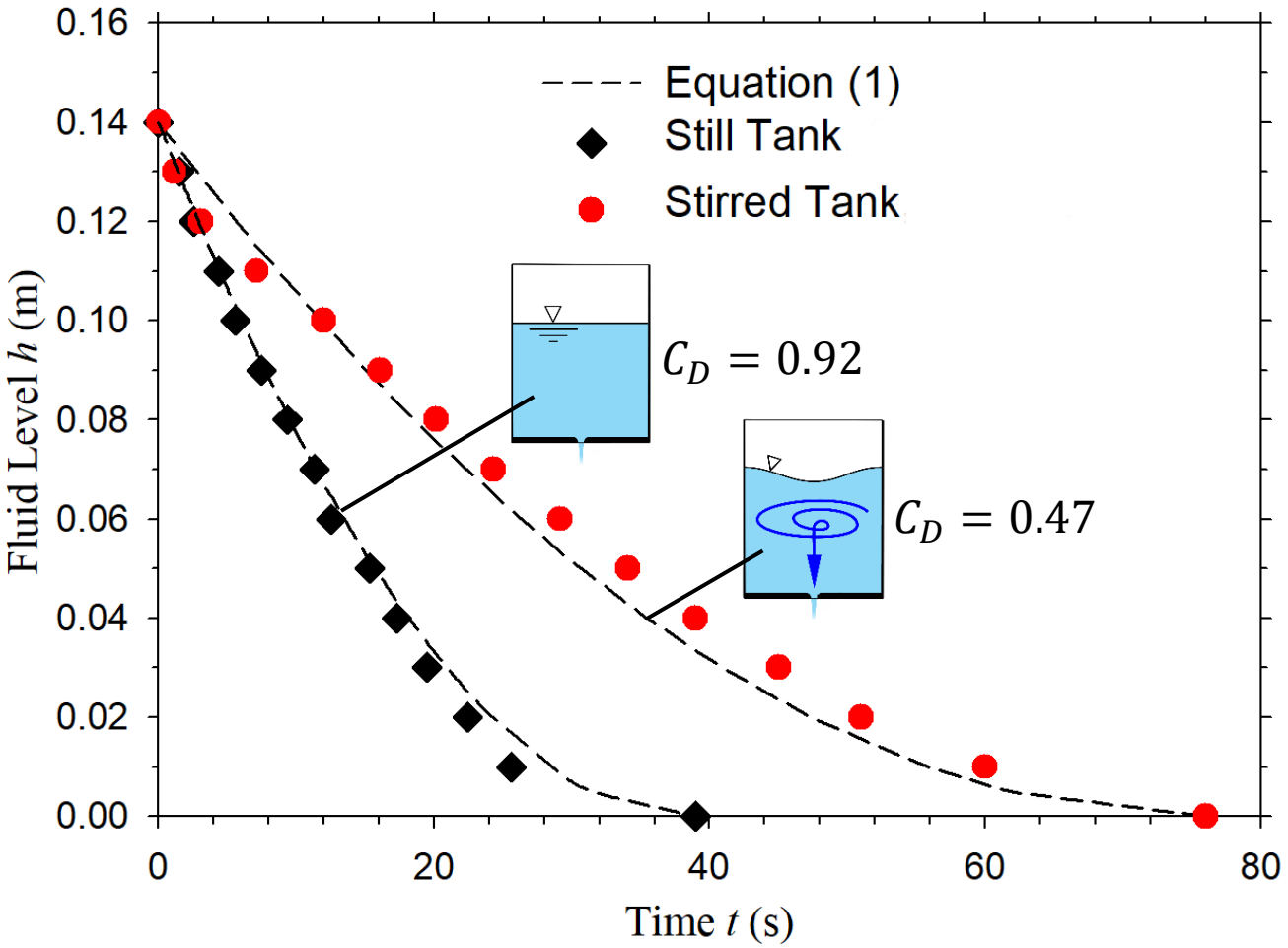


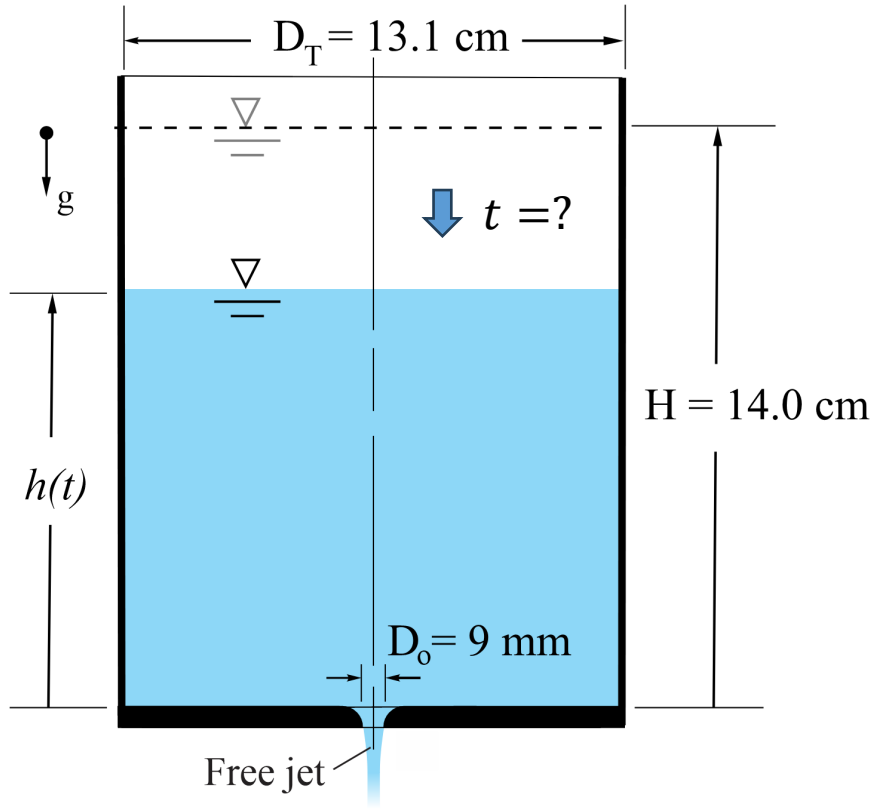
Still Tank

Comparison of Measurements & Theory

- Theoretical prediction: $h(t) = \left(H^{1/2} - \left(\frac{D_o}{D_T} \right)^2 \frac{C_D \sqrt{2g}}{2} \, t \right)^2$ Eq. (1)







Comparison of Measurements & Theory

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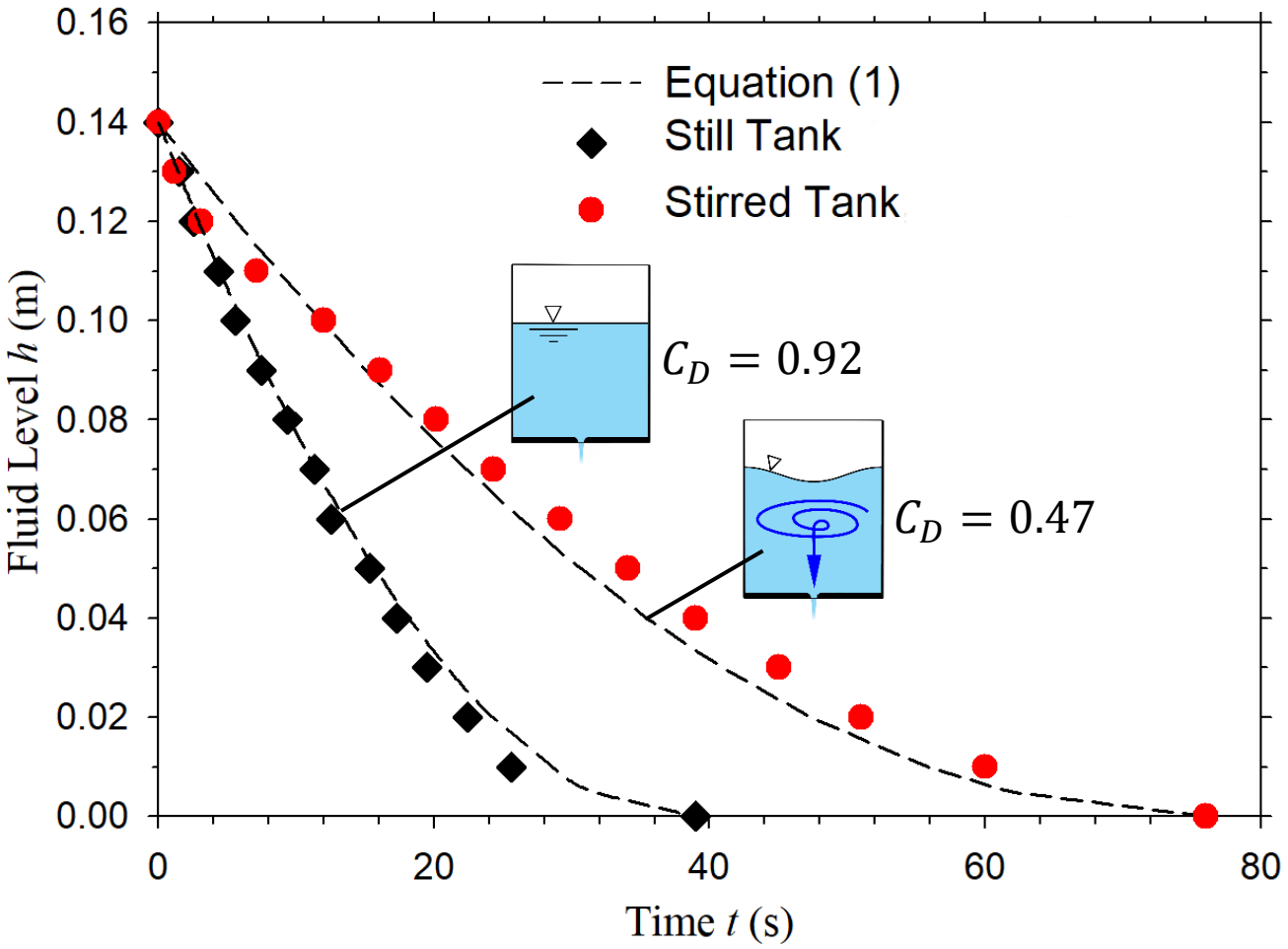
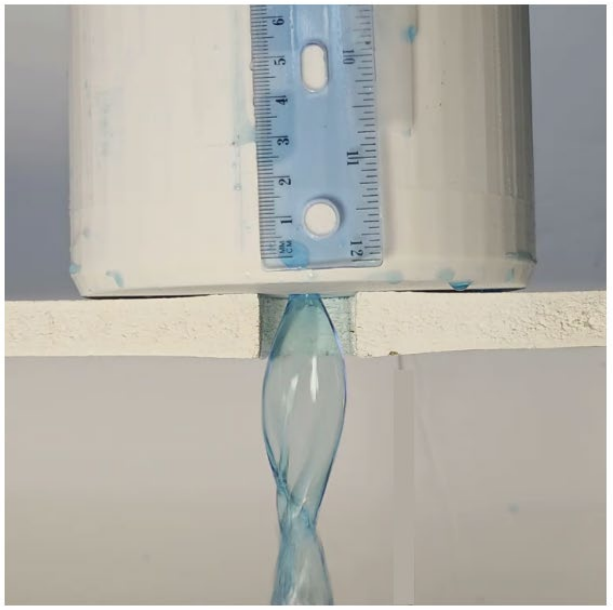


Stirred Tank



Industrial Vortex Breakers

Toronto Metropolitan University

Industrial Vortex Breakers

VC300SS - $41.21
3" Threaded Stainless Steel Anti Vortex Fitting.

Anti-Vortex Fittings

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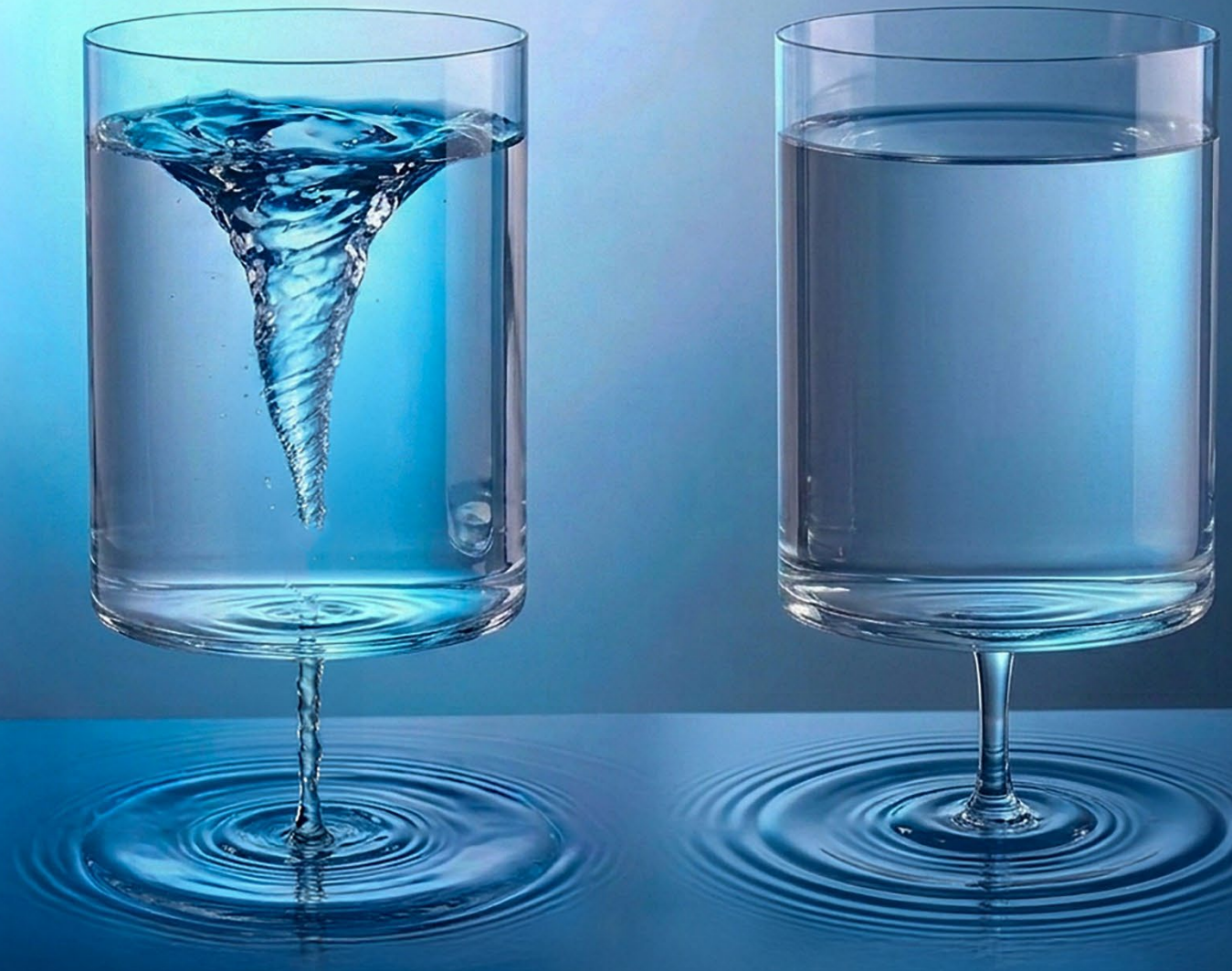
END NOTES

Presentation prepared and delivered by Professor David Naylor

Toronto Metropolitan University

The Effect of Swirl:

Which Tank Will Empty First?



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