ANSYS Taylor-Couette between Cylinders - Startup

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Problem Specification

- 1. Pre-Analysis & Start-Up
- 2. Geometry
- Mesh
 Physics Setup
- 5. Solution/Results
- 6. Verification & Validation

Pre-Analysis & Start Up

Simplified Governing Equations

In the paper "Instability of Taylor-Couette Flow between Concentric Rotating Cylinder" by Hua-Shu Dou, Boo Cheong Khoo, and Khoon Seng Yeo the equation for the critical condition of primary instability is simplified for a concentric rotating cylinder. It is given and solved in the equations below. In order

to incite Taylor-Couette flow, K_{max} must be between 370-389 so a value of 380 was chosen as K_{max} for the calculation.

$$K_{max} = \frac{\omega_1 R_1 (R_2 - R_1)}{v} = 380$$

$$v = \frac{\mu}{\rho} = 8.93 * 10^{-7}$$

$$R_1 = 0.5[m]$$

$$R_2 = 1[m]$$

$$\omega_1 = \frac{K_{max}v}{R_1(R_2 - R_1)} = 0.00135736 [rad/s]$$

Start-Up

A few words on the formatting in the following instructions:

- 1. Notes that require you to perform an action are colored in blue
- 2. General information is colored in black, but does not require any action
- 3. Words that are **bolded** are labels for items found in ANSYS AIM
- 4. Most important notes are colored in red

We are ready begin simulating in ANSYS AIM. Open ANSYS AIM by going to Start > All Apps > ANSYS 18.1 > ANSYS AIM 18.1. Once you are at the starting page of AIM, select the Fluid Flow template as shown below.



You will be prompted by the FI

uid Flow template to either Define new geometry, Import geometry file, or Connect to active CAD session. Select Define new geometry and press N ext. Finally, check the Swirling flow box in the Additional flow physics and press Finish.

Fluid Flow: Physics
Additional flow physics:
Compressible flow (ideal gas)
Thermal effects
Swirling flow
Particles (including droplets and bubbles)
Calculation type:
Steady/static
 Time-dependent
Typical settings and results will be defined automatically
Finish

Go to Step 2: Geometry

Go to all ANSYS AIM Learning Modules