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**Instabilities and transient growths of the Taylor-Couette flow in stratified fluids** JUNHO PARK, Seoul National University, PAUL BILLANT, Ecole Polytechnique, JONG-JIN BAIK, Seoul National University — The Taylor-Couette flow is centrifugally unstable in inviscid limit if  $\mu < \eta^2$  where  $\mu = \Omega_o/\Omega_i$  and  $\eta = r_i/r_o$  are the ratios of angular velocity and radius between inner and outer cylinders, respectively. In the presence of stable density stratification in axial direction, there is a new instability called Strato-Rotational Instability (SRI) due to the gravity wave resonance between the two cylinders. The SRI can occur in a wider regime of  $\mu$  than the Centrifugal Instability (CI) such that the stratified Taylor-Couette flow is always unstable except for the solid-body rotation. Moreover, in the regime of CI, both instabilities co-exist and dominance of these instability changes depending on the stratification. In this presentation, we will show some parametric study results on how these two instabilities behave. Moreover, it is important to study transient growth since it can be a candidate to explain subcritical transitions to turbulence in the stable regime. We will present how the transient growth behaviors change for the stratified Taylor-Couette flow in terms of effects of the stratification on the transient growth which can be explained by two different mechanisms.

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