Seminar

Effect of stratification and rotation on shear flow stability

Sharath K Jose

TCIS, Hyderabad

The stability of parallel shear flows to infinitesimal disturbances may be described by modal and non-modal analysis. Modal analysis defines the stability based on the growth rate prescribed by the least eigenmode. However, due to non-normal nature of the linearised operator, non-modal analysis has proven to be fairly useful to predict transition to turbulence even when there are no exponential instabilities predicted. In this talk, the effects of variations in density and viscosity, and system rotation on the non-normal stability characteristics of parallel shear flows shall be described. We also draw attention to the structure of the optimal disturbances that are most likely to trigger transition; features such as localisation of the secondary vortex structures shall be elucidated. The implications of the linear predictions in these systems within the context of the nonlinear system are also explored. A two-dimensional mechanism in stratified systems which mimics the famous lift-up mechanism of the unstratified system is also presented. To conclude, we connect the origin of exponentially growing disturbances due to body forces such as rotation to the underlying non-normal character of the linearised operator.

Thursday, Dec 15th 2016

10:30 AM (Tea/Coffee at 10:15 AM)

Seminar Hall, TCIS