

Abstract Submitted  
for the DFD14 Meeting of  
The American Physical Society

**The centrifugal instability of the boundary-layer flow over slender rotating cones**<sup>1</sup> STEPHEN GARRETT, ZAHIR HUSSAIN, University of Leicester — Existing experimental and theoretical studies are discussed which lead to the clear hypothesis of a hitherto unidentified convective instability mode that dominates within the boundary-layer flow over slender rotating cones. The mode manifests as Görtler-type counter-rotating spiral vortices, indicative of a centrifugal mechanism. Although a formulation consistent with the classic rotating-disk problem has been successful in predicting the stability characteristics over broad cones, it is unable to identify such a centrifugal mode as the half-angle is reduced. An alternative formulation is developed and the governing equations solved using both short-wavelength asymptotic and numerical approaches to independently identify the centrifugal mode.

<sup>1</sup>Supported by EPSRC grant EP/G061637/1

Stephen Garrett  
University of Leicester

Date submitted: 24 Jun 2014

Electronic form version 1.4