Abstract Submitted
for the DFD19 Meeting of
The American Physical Society

Direct measurements of the mode B instability in the wake of a two-dimensional blunt trailing edge BRADLEY GIBEAU, SINA GHAEMI, University of Alberta — Recent work has revealed contradictory results regarding the secondary instabilities that appear in the wake of a two-dimensional body with a blunt trailing edge (BTE). A linear stability analysis at Reynolds numbers near transition predicted that the aspect ratio (AR) of the body, i.e. the ratio of chord length to body thickness, dictates the secondary instabilities that exist in the wake. These authors predicted that a mode B' instability will appear in the wake for AR >7.5, in contrast to the mode B that exists in the wakes of cylindrical bodies (AR = 1). There are experimental results in the literature to support the existence of mode B'. However, the indirect analysis techniques used to show its existence have recently been found to be inadequate. We match the AR of 12.5 used in the studies that reported mode B' and also extend to a large AR of 46.5 and conduct particle image velocimetry measurements to unambiguously characterize the secondary instability in the wake. Mode B is found to be present in the wake for all Reynolds numbers investigated (Re(h) = 2600 to 26000 where h is the thickness of the BTE), suggesting that AR does not play an important role in the formation of the secondary instability. No evidence of mode B' was found.

Sina Ghaemi
University of Alberta

Date submitted: 30 Jul 2019 Electronic form version 1.4