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Investigation of the Spreading Mechanism of Turbulent Wedges and Spots[1] JEFF CHU, DAVID GOLDSTEIN, University of Texas at Austin
— We investigate the physics of turbulent wedge and turbulent spot spreading in a nominally zero pressure gradient boundary layer over a flat wall using incompressible spectral DNS and an immersed boundary method. Turbulent wedges are simulated over both physical and unphysical surfaces to identify the important factors leading to wedge spreading and turbulence regeneration. We examined both instantaneous as well as time averaged turbulent wedge flow. We find that there are low speed streaks that remain stationary in time near the outer edge of the wedge. It is plausible that turbulent wedge spreading stems from a succession of such streaks due to instabilities introduced by the streak immediately preceding it upstream. The spreading mechanisms of turbulent spots are also investigated. Turbulent spots are artificially triggered and allowed to develop over physical and unphysical surfaces. Attempts are made to view both spot spreading and turbulent wedge spreading in one coherent picture.

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