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Spatial amplification of coupled disturbances in bluff body shear layers DANIEL MOORE, MICHAEL AMITAY, Rensselaer Polytechnic Institute — Detailed experimental campaigns into separated shear layers have been carried out on a series of rectangular sections over a Reynolds number range from 13,400 to 118,00, based on the body height, at a range of angles of attack. Recent work by this same group has demonstrated the level of coupling that occurs between the convective shear layer instability at the leading and the global, large-scale instability associated with wake shedding of these sharp-edged rectangular sections. Building upon these findings, the spatial amplification of the separated shear layers is experimentally derived and compared to other shear flows including the classical planar mixing layer. Results show that the effect of a coupled shear layer manifests itself via a relatively broad spectrum of unstable frequencies and significantly elevated growth rates. On the other hand, reducing the coupling the same two instabilities has the opposite effect. It is further shown that the coupling is directly tied to a turbulent transition length, reinforcing the notion of a globally unstable flow field.

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