

Abstract Submitted  
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**On vortex pairing in several free shear layer containing high Reynolds number flows**<sup>1</sup> MO SAMIMY, MICHAEL CRAWLEY, The Ohio State University — There are several free shear flows with well known Kelvin-Helmholtz instability, which contain an additional instability mechanism. For example, a jet has shear layer and jet column instabilities, a stalled airfoil has shear layer and wake instabilities, and a cavity flow has a shear layer instability and Rossiter modes. The shear layer's most amplified frequency is normally several times larger than that of the other instability. Typically, the structures associated with the lower frequency instability are observed in the experiments. There is not much information in the literature, especially in high Reynolds number flows, on whether these structures are generated directly or by multiple merging of smaller structures generated by the shear layer instability. Single or multiple merging has been shown in the literature in only low Reynolds number flows (e.g. in jets). Our recent experimental results in high Reynolds number flows excited by plasma actuators seem to show the occurrence of multiple merging events before the observation of lower frequency large-scale coherent structures. The experimental PIV images obtained in jets using reconstructed flow and in stalled airfoils obtained using phase averaging.

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