

Abstract Submitted
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Formation of type II vortex streets ILDOO KIM, Agency for Defense Development, X.L. WU, University of Pittsburgh — In experiments in 2D soap film, we observe two kinds of vortex streets. The “type I” vortex street is stable and its Kármán ratio (the ratio of the transverse spacing to the longitudinal spacing of constituent vortices) is between 0.3 and 0.5. In contrast, the “type II” vortex street is characterized by its meta-stability and a much higher Kármán ratio, measured between 0.5 and 0.7. We studied the condition of formation of the type II vortex street by independently controlling two length scales of the system - the head-on width of the obstacle W and the thickness of the boundary layer δ before detachment. Our experiment suggests that the vortex street is type II when $\delta/W < 0.4$. The type II vortex street eventually evolves into the type I at downstream. The lifetime of this meta-stable configuration is strongly affected by the thickness δ of the boundary layer.

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