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The relationship between Strouhal number and Reynolds number for a heated cylinder in the shear layer instability regime JOSEPH LAURIENTI, TAIT POTTEBAUM, University of Southern California — The wake structure of a circular cylinder in isothermal cross flow has been extensively studied, and general agreement exists in the literature on the relationship between Strouhal number (St) and Reynolds number (Re) for parallel vortex shedding. However, no such consensus relationship exists for a heated cylinder in cross flow. Some recent studies have examined the St–Re relationship for heated cylinders in the laminar vortex shedding regime and have successfully collapsed the data from various temperature ratios ($T^* = T_{cyl}/T_\infty$) using an effective Reynolds number (Re_{eff}) that evaluates fluid viscosity at a temperature between the free stream and cylinder temperatures. The present work focuses on higher Re, where the separated shear layers become unstable. Water tunnel experiments were performed on parallel vortex shedding from a heated cylinder in the range $250 < Re < 800$ for various T^*. Long duration DPIV data sets were used to measure both vortex shedding frequency and detailed wake structure as functions of Re and T^*. St–Re curves will be presented for each T^* and the use of Re_{eff} to collapse the data will be evaluated.

Tait Pottebaum
University of Southern California

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