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The effects of unsteady boundary conditions on heat flux for flow past a circular cylinder IZHAK GIVONI, TAIT POTTEBAUM, University of Southern California — Heat transfer equipment is usually designed for specific, steady boundary and inflow conditions. In practice, systems typically deviate from the design conditions and fluctuate, resulting in an unsteady system. Models of heat transfer that incorporate fluctuations would allow for the design of equipment targeted to the actual conditions. In order to create such a model, understanding the non-linear relationship between fluctuations in the boundary conditions and fluctuations in the heat flux is critical. To reveal the details of the non-linear relationship, experiments were conducted in a water tunnel for flow past a heated cylinder. A cylinder was selected because the separation point of the boundary layer is sensitive to fluctuations in surface temperature, allowing non-linear effects to occur. Results will be presented from experiments in which random and sinusoidal temperature fluctuations were imposed on 1/3 of the cylinder surface while 2/3 of the surface was held at constant temperature. The observed relationship between heat flux and temperature fluctuations will be presented in the form of PDF's and PSD's.

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