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Active Flow Enhancement for Heat Ejection in a Diverging Channel[1] PABLO HIDALGO, ARI GLEZER, Georgia Institute of Technology — Small-scale motions that are induced within the core flow of a heated, high-aspect ratio diverging channel are investigated experimentally. The small scale motions are effected by the time-periodic vortex shedding from streamwise-embedded cantilevered reeds driven in resonance by integrated piezoelectric actuators and span the entire channel height. The induced vortices are advected with the core flow, disrupt the thermal boundary layers and result in a significant enhancement of the local heat transfer coefficient along the channel. Deliberate interactions between the reeds and a given core flow along secondary channels that are formed downstream of a center partition lead to controlled flow oscillations over a range of vibration frequencies. These interactions and the flow characteristics between the tip of the vibrating reed and the partition are investigated using high resolution particle image velocimetry (PIV). Of particular interest are the effects of variation in the reed motion and its distance to the partition on the induced small-scale motions and mixing and thus, on local and global heat transfer across the channel. Supported by DARPA and UTRC.

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