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Enhancement of convective heat transfer in internal compressible flows by stationary inserts
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Abstract
Enhancement of the natural and forced convection heat transfer has been the subject of numerous academic and industrial studies. Air blenders, mechanical agitators, and static mixers have been developed to increase the forced convection heat transfer rate in compressible and incompressible flows. Stationary inserts can be efficiently employed as heat transfer enhancement devices in natural and mixed convection systems with compressible flow. These devices have low maintenance and operating costs, low space requirements, and no moving parts. Through numerical studies, this paper demonstrates how an insert improves heat transfer in buoyancy driven flow. The numerical predictions are validated using experimental data. Using different measurement tools, the global performance of the insert and the impact of the geometrical parameters are studied, leading to identification of the most effective design for a given application. © 2010 by ASME.

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