

# Chapter 9

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## Power Spectrums and Strouhal Number Distributions for Turbulent Fully-Developed Flows in Rectangular Ducts with Spatially-Periodic Plate Inserts

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*Single hot-wire measurements of turbulent, fully-developed flows of air in a straight rectangular duct with spatially-periodic plate inserts are presented. The objective is to provide experimental results that could be used to validate mathematical models and numerical solution methods formulated for the prediction of such flows in the cores of compact heat exchangers. The following values of the dimensionless geometric parameters, normalized with respect to the full height of the duct, were considered in this work: width of the duct cross section = 6.063; plate length = 1.001; plate thickness = 0.2526; and inter-plate spacing = 1.004. The Reynolds number, based on average velocity at the minimum cross-sectional area and the hydraulic diameter, ranged from 2000 to 30000. The results presented here include ensemble-averaged power spectrums and Strouhal number distributions at multiple positions in the duct. These results are repeatable, vertically and laterally symmetric at corresponding points in the central region of the duct cross section, and spatially periodic in successive geometrical modules.*

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