FLUID DYNAMICS AT TRANSITION REGIONS OF ENHANCED HEAT TRANSFER CHANNELS, J. C. Case[1], J. P. Benhart[1], B. T. Costello[1], A. C. Fisher[1], and N. A. Pohlman*[1], Northern Illinois University[1], Department of Mechanical Engineering, DeKalb, IL 60115, npohlman@niu.edu

There have been multiple studies done on helical coils inside tubes to confirm the enhanced heat transfer benefits of the disruption of the boundary layer. Limited studies have examined the corresponding flow in fully developed conditions. However, short channels do not show the same enhanced heat transfer rate; similarly, no flow studies have looked at the fluid flow at the beginning of these coils. This study attempts to determine what happens at the transitional region of the coils and to test the theory of minimal axial distance for fully developed flow over the coils is true. Particle shadow velocimetry was used to determine the speed of the fluid as it moved through the tube. The pitch of the wire was changed to determine the possible effect it could have on the system. Determining the behavior of these tubes with helical coils would be a great benefit to designing thermal systems of minimal length to increase efficiency while saving energy and money.

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