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Forced Convective Thermal Transport and Flow Stability Characteristics in Near-Critical Supercritical Fluid NUSAIR HASAN, BAKHTIER FAROUK, MEM Department, Drexel University, Philadelphia PA 19104 — Forced convective thermal transport characteristics of supercritical carbon dioxide in vertical flow are numerically investigated. A tube with a circular cross-section and heated side-wall is considered. A real-fluid model for representing the thermo-physical properties of the supercritical fluid along with the fully compressible form of the Navier–Stokes equations and an implicit time-marching scheme is used to solve the problem. Thermo-physical properties of near-critical supercritical fluids show diverging characteristics. Large variations of density of near-critical supercritical fluid in forced convective flow can induce thermo-hydraulic instability similar to *density wave oscillations*. The developed numerical model is used for studying the effect of geometrical parameters of the tube, wall heat flux and pressure on steady-state convective thermal transport as well as the stability behavior of the supercritical fluid near its critical point. The enhancement or deterioration of heat transfer caused by the temperature-induced variation of physical properties (especially specific heat) is also investigated, as well as the effect of buoyancy on the forced convective flow.

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