Title: Dynamic Process of Supercritical/Near-Critical Fluids in Energy Systems

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Abstract:
This talk is focused on the transient behaviors of supercritial and near-critical fluid in energy systems. The challenging points are mainly found with the coupling of supercritical states with geometric designs. The transient stability behaviors of supercritical fluid based circulation loop systems will be discussed as one key example of energy system analysis. Numerical simulations and experiments will be compared with the tests results on the response of fluid flow to heat transfer and geometric variations. It is shown that the quick load/off-load conditions will lead to complex stability behaviors in supercritical systems. In this talk, the miniaturized chamber system with near-critical fluid enclosed inside will be discussed for the thin-hot boundary layer analysis for critical fluid heat tranfer and convection behaviors during both heating and cooling conditions. Such designs of micro-sized will contribute to local stability volution as well as macro-scale system behavior analysis. Different from traditional density wave stability of two-phase stability behaviors, the scenarios with complex transient response discussed in this study show new trends and it is also found possible to control the system actively.