ME 669 Thermal Hydraulics in Power Generation Technology (3-0-0-6)

Two-phase flow: Definitions, conservation equations, flow patterns, void fraction modelling, pressure drop modelling, homogeneous and separated flow models, instabilities; Two-phase heat transfer: bubble nucleation, pool boiling, subcooled and saturated flow boiling, boiling crises, post-boiling-crisis heat transfer, condensation; Thermal hydraulics of supercritical fluid systems: thermophysical properties, flow and heat transfer characteristics, modelling and analysis; Thermal design and analysis methodologies: transient analysis (single channel), loop analysis, multiple channel analysis, subchannel analysis, treatment of uncertainties.

Textbooks:
- [1] J.G. Collier and J.R. Thome, Convective Boiling and Condensation, 3rd ed., Oxford University Press, 1996.
- [2] L.S. Tong and Y.S. Tang, Boiling Heat Transfer and Two-Phase Flow, 2nd ed., Taylor and Francis, 1997.

References:
- [1] G.B. Wallis, One-Dimensional Two-Phase Flow, McGraw-Hill, 1969.
- [2] D. Chisholm, Two-Phase Flow in Pipelines and Heat Exchangers, George Goodwin, 1983.
- [3] M. Ishii, T. Hibiki, Thermo-Fluid Dynamics of Two-Phase Flow, Springer, 2006.
- [4] R.T. Lahey Jr. and F.J. Moody, The Thermal Hydraulics of a Boiling Water Nuclear Reactor, 2nd ed., American Nuclear Society, 1993.
- [5] N.E. Todreas and M.S. Kazimi, Nuclear Systems I: Thermal Hydraulic Fundamentals, Taylor and Francis, 1990.
- [6] N.E. Todreas and M.S. Kazimi, Nuclear Systems II, Taylor and Francis, 1990.