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Pressure drop and thermal-hydraulic instability analysis of super-critical CO2 natural circulation loop

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Natural circulation is a promising design option for Super-Critical Water Reactors (SCWR). This paper presents experimental results of flow oscillations encountered at high heat fluxes when the channel outlet temperature of CO_2 was above the pseudo-critical temperature. The geometry is a rectangular natural- circulation loop, heated on a lower horizontal channel and cooled on the upper horizontal heat exchanger. The boundary conditions were constant channel inlet temperature and pressure. The system pressure was 8 MPa. Due to the importance of pressure drop distribution in the heated channel on the occurrence of instability; segmental and total pressure drop measurements across the heated channel have been taken and are being analyzed to produce a relevant friction factor correlation. This expression will be compared to the available correlations for supercritical fluid flow. Flow oscillation is an undesirable phenomenon and many researchers have investigated this behavior numerically. Our experiments add extra data for supercritical flow instability.

Biography

Javad Mahmoudi has been enrolled in Ph.D. program at the University of Manitoba, Winnipeg, Canada. He joined Dr. Chatoorgoon's research group in 2010. Since then, he has been working on supercritical CO_2 natural circulation loop with the aim of investigating flow instability.

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