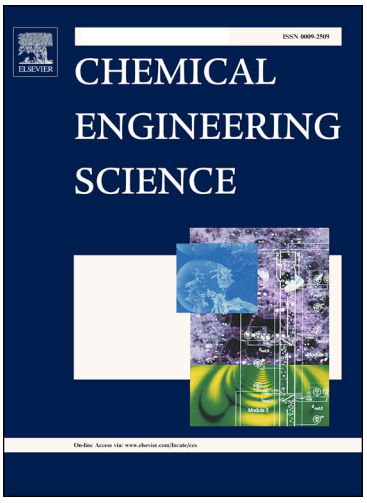

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A semi-analytical model for linear stability analysis of rectangular natural circulation loops

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Abstract

A semi-analytical model for stability analysis of natural circulation loops (NCL) with conventional localized surface heating and cooling is derived based on linear stability analysis (LSA) methodology. Considerations for local pressure losses, wall thermal inertia and finite secondary side heat transfer coefficient at cooler are given in this model. Heat losses are also incorporated to extend the scope of the model to high temperature loops like those operating with pressurized water, molten salts and liquid metals. A new parameter space is introduced for representing the stability maps. This parameter space gives a direct representation of operating variables and focuses on stability behavior at only feasible (theoretically) operating conditions for a given loop. The model is validated against the experimental data of two rectangular natural circulation loops from literature. The stability maps generated by this LSA model are further

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