Clausse, Alejandro; **Lahey, Richard T. jun.**

The analysis of periodic and strange attractors during density-wave oscillations in boiling flows. (English) Zbl 0732.76090

Summary: The occurrence of periodic and strange attractors for a boiling flow is considered. A nonlinear homogeneous one-dimensional two-phase flow model of the conservation equations is analyzed using a nodal averaging method to obtain a system of nonlinear ordinary differential equations. It was found that, for constant pressure drop boundary conditions, the flow undergoes a supercritical bifurcation evolving to a stable limit cycle due to density-wave instability. A cascade of bifurcations leading to chaos was found at low flow rate conditions in a system comprised of a boiling channel coupled with an adiabatic riser.

MSC:

76T99	Multiphase and multicomponent flows
37C70	Attractors and repellers of smooth dynamical systems and their topological structure
37D45	Strange attractors, chaotic dynamics of systems with hyperbolic behavior
37G15	Bifurcations of limit cycles and periodic orbits in dynamical systems

Cited in **1** Document

Keywords:

strange attractors; boiling flow; nonlinear homogeneous one-dimensional two-phase flow; nodal averaging method; supercritical bifurcation; stable limit cycle; density-wave instability; chaos

Full Text: DOI

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