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[Kerntechnik](#)  
Volume 73, Issue 5-6, 2008, Pages 234-237

# Study on the thermal-hydraulics characteristics of a boiling two-phase natural circulation loop with nanofluids

[Nayak, A.K.](#) , [Gartia, M.R.](#)  
Reactor Engineering Division, Bhabha Atomic Research Centre, Trombay, Mumbai 400085, India

## Abstract

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In this paper, we present the steady state and stability behaviour of a boiling two-phase natural circulation loop with a small concentration of Al<sub>2</sub>O<sub>3</sub>, nanofluids. For this, experiments were conducted in a natural circulation loop at different operating powers, pressures, and water levels in the steam drum. The test results revealed that while the steady state natural circulation behaviour is similar, however, the buoyancy induced flow rates are found to be relatively higher with nanofluids than with water alone. In addition, with nanofluids, the amplitudes of the boiling induced Type I instabilities are found to be significantly reduced. However, the Type II instabilities are found to appear at relatively lower power with addition of nanofluids as compared to that with water alone. The most interesting result is that with addition of nanofluids, the amplitudes of Type II instabilities are found to get suppressed with increase in power similar to that of low quality Type I instability. © Carl Hanser Verlag.

## Indexed Keywords

Engineering controlled terms: Concentration (process); Natural convection; Ozone water treatment; Phase stability; Power quality; Two phase flow; Water levels

Engineering uncontrolled terms: Induced flow rates; Low qualities; Nanofluids; Natural circulation loops; Natural circulations; Operating powers; Small concentrations; Steady states; Steam drums; Test results; Type II



Engineering main heading: Nanofluidics



ISSN: 09323902 CODEN: KERNE Source Type: Journal Original language: English  
Document Type: Article


## References (9)

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 [Vijayan, P.K., Nayak, A.K.](#)  
1 (2005) Introduction of instabilities in natural circulation systems  
IAEA-TECDOC1474  


 [Chexal, V.K., Bergles, A.E.](#)  
2 Two-phase flow instabilities in a low pressure natural circulation loop  
(1973) AIChE Symp. Ser, 69, p. 37. [Cited 23 times.](#)  


 [Lee, S.Y., Ishii, M.](#)

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Kyung, I.S., Lee, S.Y.

4 [Experimental observations on flow characteristics in an open two-phase natural circulation loop](#)(1994) Nuclear Engineering and Design, 150 (1), pp. 163-176. [Cited 37 times](#).[View at publisher](#)[Di cover full text](#)

Nayak, A.K., Dubey, P., Chavan, D.N., Vijayan, P.K.

5 [Study on the stability behaviour of two-phase natural circulation systems using a four-equation drift flux model](#)(2007) Nuclear Engineering and Design, 237 (4), pp. 386-398. [Cited 8 times](#).

doi: 10.1016/j.nucengdes.2006.05.009

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Fukuda, Kenji, Kobori, Tetsuo

6 [CLASSIFICATION OF TWO-PHASE FLOW INSTABILITY BY DENSITY WAVE OSCILLATION MODEL.](#)(1979) Journal of Nuclear Science and Technology, 16 (2), pp. 95-108. [Cited 106 times](#).[Di cover full text](#)

Nayak, A.K., Lathouwers, D., Van Der Hagen, T.H.J.J., Schrauwen, F., Molenaar, P., Rogers, A.

7 [A numerical study of boiling flow instability of a reactor thermosyphon system](#)(2006) Applied Thermal Engineering, 26 (5-6), pp. 644-653. [Cited 10 times](#).

doi: 10.1016/j.applthermaleng.2005.05.019

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Gartia, M.R., Vijayan, P.K., Pilkhwal, D.S.

8 [A generalized flow correlation for two-phase natural circulation loops](#)(2006) Nuclear Engineering and Design, 236 (17), pp. 1800-1809. [Cited 14 times](#).

doi: 10.1016/j.nucengdes.2006.02.004

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Das, S.K., Putra, N., Thiesen, P., Roetzel, W.

9 [Temperature dependence of thermal conductivity enhancement for nanofluids](#)(2003) Journal of Heat Transfer, 125 (4), pp. 567-574. [Cited 577 times](#).

doi: 10.1115/1.1571080

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Nayak, A. K.; Reactor Engineering Division, Bhabha Atomic Research Centre, Trombay, Mumbai 400085, India; email: [arunths@barc.gov.in](mailto:arunths@barc.gov.in)

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