

多相流

## 含相变颗粒流体的Rayleigh-Benard对流热启动

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摘要

关键词 [Rayleigh-Benard对流](#) [相变物质](#) [线性稳定性](#) [数值分析](#)

分类号

## ONSET OF RAYLEIGH-BENARD CONVECTION IN FLUID LAYER DISPERSED WITH PHASE-CHANGE-MATERIAL PARTICLES

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### Abstract

The onset of Rayleigh-Benard convection in a fluid layer dispersed with phase-change-material particles was studied numerically by using the linear stability theory. The dimensionless fluctuation of specific heat  $Q$  with dimensionless temperature  $T$  was given as a form of sine-function  $Q=1+b\sin(\psi T)$ . Two kinds of numerical methods were used separately in the calculation of critical Rayleigh number  $Ra_{cr}$  and wave number  $k_{cr}$ . One was the numerical integration method using Simpson 1/3 rule, and the other was the numerical difference method of Runge-Kutta with Newton-Raphson iteration. Both methods showed the same calculation results that the critical Rayleigh number  $Ra_{cr}$  decreased monotonically with increase in the amplitude  $b$  of the sine-function, however, the critical wave number  $k_{cr}$  did not show much difference with the amplitude  $b$  of the sine-function while  $\psi=\pi/2$ , but exponentially increased while  $\psi=\pi$ .

**Key words** [Rayleigh-Benard convection](#) [phase change material](#) [linear stability theory](#) [numerical analysis](#)

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