

On the spectrum of Euler-Lagrange operator in the stability analysis of Benard problem

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Abstract

In studying the stability of Benard problem we usually have to solve a variational problem to determine the critical Rayleigh number for linear or nonlinear stability. To solve the variational problem one usually transform it to an eigenvalue problem which is called Euler-Lagrange equations. An operator related to the Euler-Lagrange equations is usually referred to as Euler-Lagrange operator whose spectrum is investigated in this paper. We have shown that the operator possesses only the point spectrum consisting of real number, which forms a countable set. Moreover, it is found that the spectrum of the Euler-Lagrange operator depends on the thickness of the fluid layer.

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