

A unified system describing dynamics of chaotic convection  
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Abstract

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Since Lorenz' s work, many autonomous systems for investigating chaotic thermal convection in pure fluid layers or in fluid-saturated porous media have been presented. From considering thermal convection in Oldroydian fluid-saturated porous media using thermal non-equilibrium model, a novel, unified system with six-order dynamics of chaotic convection was derived in this study. The six-order system can be used to investigate thermal convection in both pure Newtonian/viscoelastic fluid layers and in Newtonian/viscoelastic fluid-saturated porous media. Most of the chaotic convection systems previously reported in the literature are shown to be special cases of the system presented in this study.

Keyword : chaotic convection