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عنوان مقاله:

Stability analysis of conveying-nanofluid functionally graded nanotube based on nonlocal couple stress theory

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نویسندگان:

.Rouzbeh mahmoudi - *Department of Mechanical Engineering, Yasouj University, Yasouj, Iran*

.Mohammad Hosseini - *Department of Mechanical Engineering, University of Hormozgan, Bandar Abbas, Iran*

.Ahmad Soleimani - *Department of Mechanical Engineering, University of Jiroft, Jiroft, Iran*

خلاصه مقاله:

The dynamics behavior and stability of axially functionally graded fluid-conveying nanotube is investigated, in this paper. The simultaneous influence of both fluid flow and variation of modulus of elasticity on the behavior of simply–simply supported (S-S) and clamp-clamp (C-C) boundary conditions conveying fluid were studied. Small-scale effects are considered using nonlocal couple stress theory in the solid part and in the fluid part. Based on the nonlocal couple stress theory, Bernoulli-Euler beam theory, and Hamilton's principle, the governing equation of motion, and associated boundary conditions were derived to explain fluid-structure interaction (FSI). These equations were solved using Galerkin numerical method and temporal differential equation analysis method. The effects of some parameters such as Knudsen number, density, size parameter, and … were investigated. According to the results, it can be seen that the present method has created an equilibrium for the effect of the size parameters (μ, l) on the critical velocity. The higher value of the Knudsen number caused sooner divergence and flutter instabilities to happen. The results show that if the parameters of the size effect are not considered, it causes errors in the calculations. The obtained .results confirm the crucial effects of size

کلمات کلیدی:

size-dependent solid-fluid interaction, nonlocal couple stress theory, Functionally Graded Materials, nanotube

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