عنوان مقاله:

Analysis of the nonlinear axial vibrations of a cantilevered pipe conveying pulsating two-phase flow

محل انتشار:

مجله مکانیک کاربردی محاسباتی, دوره 51, شماره 2 (سال: 1399)

تعداد صفحات اصل مقاله: 12

نویسندگان:

Adeshina Adegoke - *Department of Mechanical Engineering, University of Lagos, Nigeria*

Omowumi Adewumi - *Department of Mechanical Engineering, University of Lagos, Nigeria*

Akin Fashanu - *Department of Systems Engineering, University of Lagos, Nigeria*

Ayowole Oyediran - *Department of Mechanical Engineering, University of Lagos, Nigeria*

خلاصه مقاله:

The parametric resonance of the axial vibrations of a cantilever pipe conveying harmonically perturbed two-phase flow is investigated using the method of multiple scale perturbation. The nonlinear coupled and uncoupled planar dynamics of the pipe are examined for a scenario when the axial vibration is parametrically excited by the pulsating frequencies of the two phases conveyed by the pipe. Away from the internal resonance condition, the stability regions are determined analytically. The stability boundaries are found to reduce as the void fraction is increasing. With the amplitude of the harmonic velocity fluctuations of the phases taken as the control parameters, the presence of internal resonance condition results in the occurrence of both axial and transverse resonance peaks due to the transfer of energy between the planar directions. However, an increase in the void fraction is observed to reduce the amplitude of oscillations due to the increase in mass content in the pipe and which further dampens the motions of the pipe.

کلمات کلیدی:

Axial Vibration, Parametric resonance, Void fraction, Two phase flow, Perturbation method