

Parametric Instability and Chaos in the Simple Portal Under Ground Motion

Verica Raduka, Josip Dvornik

Department of Technical Mechanics, Faculty of Civil Engineering, University of Zagreb, Zagreb, Croatia

The responses of an elastic frame, with inertial nonlinearities (single degree of freedom) due to vertical and horizontal ground motion, are investigated. The horizontal component of ground motion acts as an ordinary lateral forcing effect on the structure. The vertical component of ground motion acts in a parametric manner on lateral displacement. If only the vertical ground motion acts (and if the ground motion is periodic in time), the well known dynamic instability in Bolotin's sense can occur. If interactions between horizontal and vertical forces are considered, the instability regions must be analysed in the different manner. The results of the numerical analysis reveal periodic, quasi-periodic and chaotic motions, as shown in Poincaré's maps.

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