



A SIMPLIFIED EARTHQUAKE DYNAMICS OF A COLUMN LIKE STRUCTURE WITH FRACTIONAL TYPE OF DISSIPATION

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ABSTRACT: A system of three stone blocks positioned one on another with viscoelastic plates between them, subjected to a shear loading was considered. The constitutive model of the plates comprises simple shear deformation pattern, fractional derivatives of shear stress and shear strain and the restrictions on the coefficients that follow from Clausius-Duhem inequality. Initially the system was at rest forming a column like structure. At certain moment the lowest block start to move periodically along the base line that is normal to axis of the column. It was shown that the dynamics of the system is governed by two coupled differential equations of real order. The motion of the obtained two-degrees of freedom system is obtained by use of the Laplace transform and inversion by complex integral. The proposed model could be used for the analysis of column like structures with polymers and elastomers and other real materials, which could be important for sky-scrapers and antic-columns protection.

Key words: fractional derivatives, column like structure, earthquake

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