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Optimal Design of Elasto-Plastic Structures Subjected to Normal Loads and Earthquake

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The optimal design of elasto-plastic structures subjected to multiparameter (normal) loads and earthquake is presented. It is assumed that under normal loads the structure must be in elastic stage. In case of earthquake different approximate methods are used in which the plastic reserve of the structure and viscous effects are also taken into account. Introducing bounds for the elastic and permanent deflections a unified optimal design method is elaborated in which both the normal loads and the earthquake are simultaneously taken into consideration. The proposed method is based on the finite element method and on the concept of porous material where the material distribution is described by the densities of the finite elements, which are considered design variables. Numerical test examples are presented.

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