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ACTIVE CONTROL FOR A 2DOF OF BUILDING INCLUDING ELASTOPLASTIC SOIL-STRUCTURE COUPLING TERMS

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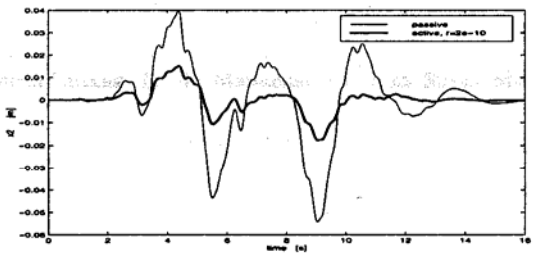
In order to analyze dynamical behaviour of buildings, and to take into account soil-structure coupling, in this paper we intend to introduce an extension of the model resulting from translational cone model for soil-foundation interaction. This extension includes elastoplastic terms in order to improve models for soil-structure coupling. To take into account either plastic behaviour of soil or friction between soil and structure seems to be a reasonable extension. We observe that the introduced mechanical model can be subsumed under form conventiently described in the language of maximal monotone operators where it is proved that system describing the dynamics of this model possesses a unique solution. We are interested indeed



Displacement x_2 versus time t for the passive and active control.

in active control procedure for such an extended model. Active control has already been extensively studied. Applications to control of structures have been given in many work for linear model of buildings. Here we intend to extend the results of active control method to mechanical systems including elastoplastic terms. An active control procedure has been applied to a two degrees-of-freedom mechanical system including the elastoplastic terms. The theoretical consideration resulted in a solution to the classical Riccati equations which holds for both stationary and non-stationary cases. The included numerical example demonstrates an efficiency of the introduced theory and the numerical scheme in order to an active control of building-soil-foundation model. Active control improves the dynamical behaviour of second masses in comparison to the passive behaviour. Numerical results are presented for a two-degrees-of-freedom mechanical system under stochastic solicitations.

Keywords: elastoplasticity , activ control.