acceleration time histories of the first storey unit between the new control method presented in this paper and no control are presented in Figure 6.

From Figure 6, one can observe that the new control method presented in this paper is quite effective in reducing the structural responses, particularly during the

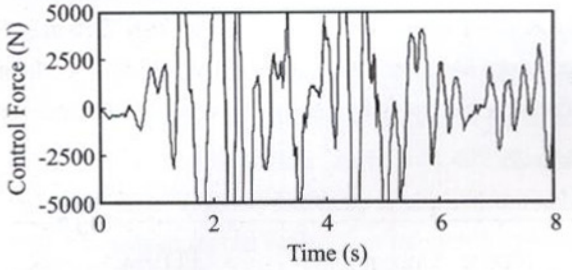

Fig. 7. Control force time histories using FDVSC.

peak response period.

The control force time histories for the new control method are presented inFigure 7.

From Figure 7, we can see clearly that our control method can keep the chattering effect sufficiently low. To verify insensitiveness of the new method against the parametric or structural uncertainties, the values of the stiffness have been deviated by ±30%. As a result, Figure 8 clearly shows the robustness of the proposed controller.

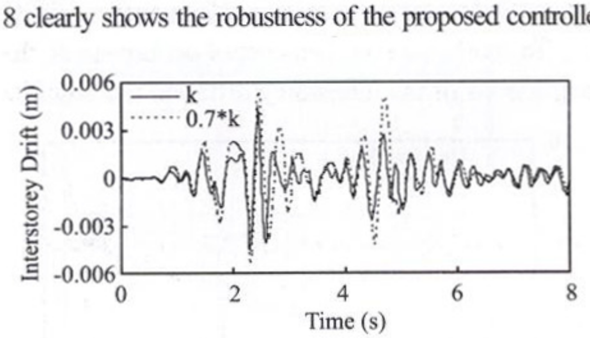

Fig. 8. The comparison of the responses of original systemand the system having 30% parametric uncertainties.

In Figure 10, the value of the original system's stiffness denoted by "k" and the value of deviated stiffness denoted by "0.7k".

5. Conclusions

In this paper, a new discrete-time variable structure control method involving fuzzy adaptive regulation of reaching law is presented for seismic isolation of structures with the aim of avoiding the undue chattering effect of conventional DVSC method involving exponential reaching law. The effectiveness of the proposed method in reducing the structural responses and avoiding the undue chattering effect has been demonstrated by numerical simulation. Numerical simulation results show preliminary that the proposed control algorithm is quite effective. Furthermore, it is shown that the proposed control method is not sensitive against structural and unstructural uncertainties. The results of this investigation, therefore, indicate that the proposed control method could be used for control of seismically excited structures.

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