structure's mass and can be as large as 30% of the peak acceleration. Outside resonance conditions, the ground motion is almost unaffected by the presence of the artefact. (from Authors)

967254
Critical cross power spectral density functions and the highest response of multi-supported structures subjected to multi-component earthquake excitations
A. Sarkar & C. S. Manohar, *Earthquake Engineering & Structural Dynamics*, 25(3), 1996, pp 303-315.

Spatially extended structures such as long span bridges and pipelines and internal secondary structures such as piping in nuclear power plants are multi-supported and each support is subjected to multi-component support motions during an earthquake. Design earthquake support motions for these structures can be specified in terms of time histories, response spectra or random processes/fields. The relationship between these three forms of seismic load specifications, for multi-support and multi-component excitations, are not obvious. From this research it emerges that the highest system response is associated neither with fully correlated support motions, nor with independent motions, but, instead, specific forms of cross power spectral density functions are shown to exist which produce bounds on the response of a given structure. (from Authors)

967255
Problems and certainties in the experimental simulation of the seismic response of MDOF structures
G. M. Calvi & G. R. Kingsley, *Engineering Structures*, 18(3), 1996, pp 213-226.

A critical discussion of problems in the experimental simulation of seismic loads on civil structures is presented, primarily addressing issues concerning the choice of test method, (dynamic, static, or pseudodynamic), the selection of appropriate ground motions, and the method of controlling tests, (in force control, displacement control, or a combination of the two). Particular attention is given to the problem of the interaction between applied actions and observed response in structures with multiple degrees-of-freedom. Three examples of structural tests are cited to illustrate hybrid tests in which novel approaches have been used. (from Authors)

967256
Control of seismically excited building structures using variable damper systems
Chin-Hsiung Loh & Ming-Jin Ma, *Engineering Structures*, 18(4), 1996, pp 279-287.

This paper aims to study the effectiveness of using an active variable damper system to control seismically excited building structures. The Liapunov direct method was used to design the controller and the weighting matrix Q can be obtained by making the derivative of the Liapunov function as negative as possible. The control system, using an active variable damper, provides time-varying damping to the structure at every instant of time and the error estimate of system matrix A will not significantly effect the control result. A comparison of the efficiency of the control between classical optimal control and the present method is made. A combination of the active variable damper system with a passive base-isolation system proved to be the most effective. (from Authors)

967257
Inelastic torsional coupling of building models
W. Jiang, G. L. Hutchinson & J. L. Wilson, *Engineering Structures*, 18(4), 1996, pp 288-300.

This paper presents the results of a detailed parametric study of the inelastic earthquake response of single storey asymmetric building models. The performance of four different models are examined. The responses of two systems with the same value of stiffness eccentricities are compared using two different approaches. The uncoupled torsional to lateral frequency ratio may also be calculated by different means, and the effect of the frequency ratio on the behaviour of structural models is examined. The influence of the relative value of stiffness and strength eccentricities on the seismic response of the structural models is investigated. The effective parameters which cause critical element shifting are discussed in detail. (from Authors)

967258
Seismic analysis of towers including foundation uplift
Chaojin Xu & C. C. Spyrakos, *Engineering Structures*, 18(4), 1996, pp 271-278.

A seismic analysis procedure including soil-structure interaction and partial foundation uplift for tower structures is developed. The nonlinear equations of motion are derived with the aid of Lagrange's equation. Studies indicate that the effects of soil stiffness on a short tower are greater than on a slender one. The height-width ratio affects the seismic response of the tower significantly. The allowance of foundation uplift may substantially reduce the seismic response of moment and foundation rotation in the case of hard soil and a slender tower, or may greatly increase the seismic response of shear in the case of hard soil and a short tower. The study concludes that uplift is not always beneficial and its effects could be significant for structures under strong seismic motions. (from Authors)

967259
Study on aseismic behavior of masonry structure under three directional earthquake excitation
Zhou Deyuan, *Earthquake Engineering & Engineering Vibration*, 15(3), 1995, pp 119-126.

A shaking table test of two masonry structure models under three directional earthquake excitation is introduced. Based on the data obtained parameter identification calculation is carried out. By using the calculated parameters, the nonlinear response analysis of masonry structure under three directional earthquake excitation is carried out. Finally, effect on the aseismic behavior of masonry structure of three directional earthquake excitation is discussed. (English summary)

967260
Review of current research on structural vibration control by using tuned liquid damper (in Chinese)
Li Hongnan, Yan Shi & Jia Lianguang, *Earthquake Engineering & Engineering Vibration*, 15(3), 1995, pp 99-110.

The state-of-art of current research and applications of the tuned liquid damper are presented in this paper. It includes the advantages and development history, theoretical computation models experiments, applications to actual structures and the directions of further research. (from Enlgish summary)

967261
Applications of inverse problem to engineering vibration (in Chinese)
Wang Yunjian, *Earthquake Engineering & Engineering Vibration*, 15(3), 1995, pp 59-68.

A method, combining analytical computation of the inverse problem in vibration with the measurement technique of nondestructive test for evaluating the structural strength of building is given in this paper. This method is used to evaluate the load-bearing capacity of a building, so can be used to appraise construction quality, diagnose faults and predict earthquake damage. (from English summary)

967262
Practical calculation method for fuzzy random reliability of structures (in Chinese)
Wang Guangyuan & Liu Yubin, *Earthquake Engineering & Engineering Vibration*, 15(3), 1995, pp 38-46.

Using fuzzy random variables as basic variables, the authors define a structural fuzzy random failure function and analyze the fuzziness between structural effective state and failure state. A structural fuzzy random limit state equation is established. Using order relation, a structural fuzzy safety criterion of single-failure mode is given. Structural failure