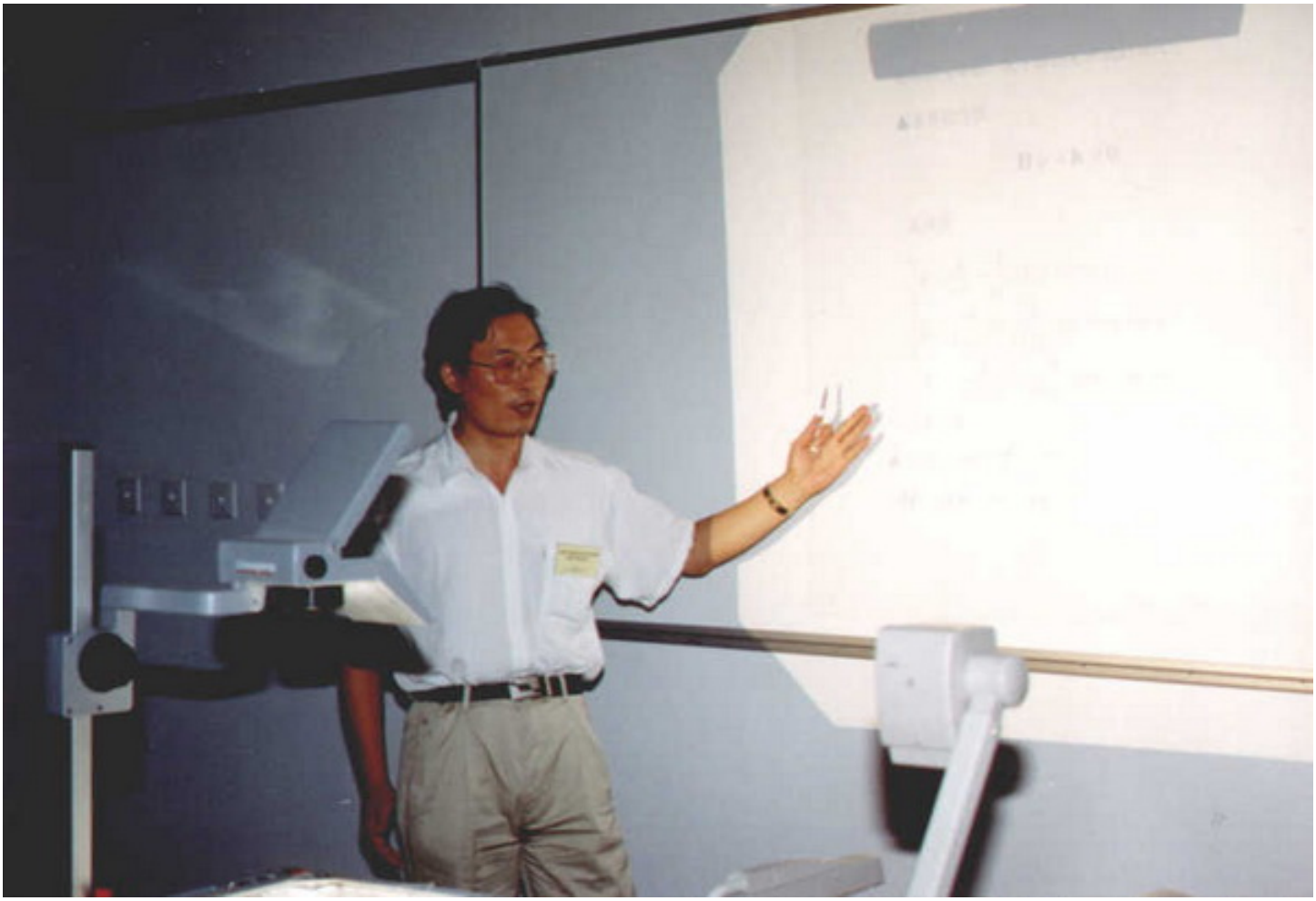

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Selected Publications:

XU Xinsheng (1), SU Xianyue (2), WANG Ren (2)
(1) Institute of Engineering Mechanics, Dalian University of Technology, Dalian 116023, China
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"Dynamic buckling of elastic-plastic cylindrical shells and axial stress waves", Science China Mathematics, Vol. 38, No. 4, pp. 472-480, 1995, http://math.scichina.com:8081/sciAe/EN/
ABSTRACT: The mechanism for bifurcation of elastic-plastic buckling of the semi-infinite cylindrical shell under impacting axial loads is proposed based on the theory of stress wave. Numerical results on three kinds of end supports and step and impulse loads are given.

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"Dynamic buckling of cylindrical shells subject to an axial impact in a symplectic system", International Journal of Solids and Structures, Vol. 43, No. 13, June 2006, pp. 3905-3919, doi:10.1016/j.ijsolstr.2005.03.005
ABSTRACT: This paper discusses the dynamic pre-buckling of finite cylindrical shells in the propagation and reflection of axial stress waves. By introducing the Hamiltonian system into dynamic buckling of structures, the problem can be described mathematically in a symplectic space. The solutions of Hamiltonian dual equations shown in canonical variables are obtained. The problem is reduced to the determination of eigenvalues and eigensolutions, with the former indicating critical buckling loads and the latter buckling modes. Numerical example presented shows phenomena of axisymmetric and non-axisymmetric dynamic buckling subject to impacts of axial load.

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"Hamiltonian System for Dynamic Buckling of Transversely Isotropic Cylindrical Shells Subjected to an Axial Impact", International Journal of Structural Stability and Dynamics, Vol. 8, No. 3, September 2008,
DOI: 10.1142/S0219455408002764
ABSTRACT: This paper investigates the prebuckling dynamics of transversely isotropic thin cylinder shells in the context of propagation and reflection of axial stress waves. By constructing the Hamiltonian system of the governing equation, the symplectic eigenvalues and eigenfunctions are obtained directly and rationally without the need for any trial shape functions, such as the classical semi-inverse method. The critical loads and buckling models are reduced to the problem of eigenvalues and eigensolutions, in which zero-eigenvalue solutions and nonzero-eigenvalue solutions correspond to axisymmetric buckling and nonaxisymmetric buckling, respectively. Numerical results reveal that energy is concentrated at the unconstrained free ends of the shell and the buckling modes have bigger bell-mouthed shapes at these positions.

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"Dynamic local and global buckling of cylindrical shells under axial impact", Engineering Structures, Vol. 31, No. 5, May 2009, pp. 1132-1140, doi:10.1016/j.engstruct.2009.01.009
ABSTRACT: In this paper, the local and global buckling of cylindrical shells under axial, compressive impact loads is studied. A Hamiltonian system is introduced in the problem. The fundamental problem in the system can be described mathematically by the Hamiltonian dual equations, which are expressed in four pairs of dual variables. The problem is reduced to a problem of eigenvalues and eigensolutions for critical loads and buckling modes, respectively. The buckling modes can be described by their respective orders and they are grouped into two classes, the short-wave or local buckling and the long-wave or global buckling. The solutions are obtained analytically and numerically, and some rules observed are indicated.

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"A Symplectic Hamiltonian Approach For Thermal Buckling Of Cylindrical Shells", International Journal of Structural Stability and Dynamics, Vol. 10, No. 2, June 2010, DOI: 10.1142/S0219455410003506
ABSTRACT: The paper deals with the thermal buckling of cylindrical shells in a uniform temperature field based on the Hamiltonian principle in a symplectic space. In the system, the buckling problem is reduced to an eigenvalue problem which corresponds to the critical temperatures and buckling modes. Unlike the classical approach where a predetermined trial shape function satisfying the geometric boundary conditions is required at the outset, the symplectic eigenvalue approach is completely rational where solutions satisfying both geometric and natural boundary conditions are solved with complete reasoning. The results reveal distinct axisymmetric buckling and nonaxisymmetric buckling modes under thermal loads. Besides, the influence for different boundary conditions is discussed.

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"Symplectic Method For Dynamic Buckling Of Cylindrical Shells Under Combined Loadings", International Journal of Applied Mechanics, Vol. 05, No. 04, December 2013, DOI: 10.1142/S1758825113500427
ABSTRACT: A symplectic system is developed for dynamic buckling of cylindrical shells subjected to the combined action of axial impact load, torsion and pressure. By introducing the dual variables, higher-order stability governing equations are transformed into the lower-order Hamiltonian canonical equations. Critical loads and buckling modes are converted to solving for the symplectic eigenvalues and eigensolutions, respectively. Analytical solutions are presented under various combinations of the in-plane and transverse boundary conditions. The results indicated that in-plane boundary conditions have a significant influence on this problem, especially for the simply supported shells. For the shell with a free impact end, buckling loads should become much lower than others. And the corresponding buckling modes appear as a "bell" shape at the free end. In addition, it is much easier to lose stability for the external pressurized shell. The effect of the shell thickness on buckling results is also discussed in detail.