

average impact force, and other characteristics of concern. The impact stiffness is calculated by the "Hertzian" method.

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**Collapse Analysis of Structures**, PVP Special Publication, Vol. 84, ASME, New York.

This special publication contains the invited papers presented at a symposium entitled "Collapse Analysis of Structures," which was part of the program at the 1984 Pressure Vessels Piping Conference held in San Antonio, Texas. This volume, and the symposium itself, are dedicated to the memory of Bo Almroth, a major pioneer in the modern development of buckling and collapse analysis methods. Many of the papers presented are the work of Bo's colleagues and co-workers and are the result, directly or indirectly, of his influence. In addition, there are contributions which present novel ideas in the field of collapse analysis, and which are thereby a fitting tribute to Bo Almroth.

The arrangement of the papers in this volume is intended to lead the reader from the general to the particular and also to convey a sense of the contemporary state of collapse analysis methodology and application. The survey of Bushnell provides a comprehensive and detailed picture of most aspects of computational methods for buckling and collapse, a highlight of which is the large, but carefully selected bibliography.

A major computational difficulty with the analysis of collapse has hitherto been the inability to successfully traverse the limit point. Papers by Riks and by Stehlin and Brogan discuss the theory and application of solution procedures which render this problem tractable. The latter paper also illustrates the computational advantages of the reduced basis method.

Inherent in collapse problems is the development of large rotations in the structure. Rankin and Brogan develop a new corotational method which accounts for large rotations. The method is independent of the element formulation and is therefore of great practical utility for existing finite element codes presently limited to moderate rotations.

Stolarski, Belytschko, Carpenter and Kennedy describe a simple triangular shell element which includes the effects of bending-membrane coupling at the element level, but which avoids membrane locking and spurious kinematic modes. Results based on this element are shown to agree well with previous solutions for a number of nonlinear problems.

Charter and Hutchinson describe a number of special buckling phenomena which have the character of quasi-static propagation of instability modes for which the consideration of plastic behavior is essential. This phenomenon is of specific interest for long pipes under external pressure.

Samuelson provides a survey of the present state of analysis for creep collapse of structures and cites a number of correlations between experiment and theory.

Interesting applications of collapse analysis methods are to be widely found in the literature, but the present volume contains three examples which are, to some extent, unusual. Knight and Starnes have successfully investigated the post-buckling behavior of composite panels with cutouts both experimentally and analytically. Sauve, Teper and Nickell present an approach for determining structural margins against dynamic collapse of structures which avoids the necessity for repeated dynamic analyses. In the final paper, Konter discusses a number of specific applications for

nonlinear collapse including the interaction of local and global collapse.

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**Design of Elevated Temperature Piping**, PVP Special Publication, Vol. 86, ASME, New York.

The Pressure Vessel Research Committee (PVRC) Task Group on Elevated Temperature Piping has addressed itself to a number of current technical problems beyond those covered under PVRC contracts. It is desirable to carry these discussions through to documentation to provide the information to people not present at the meetings. To achieve the desired documentation, this publication was developed. The papers do not provide formal consensus reports of the Task Group, but do provide the works of individuals who have participated in the discussions of the Task Group.

Various types of organizations are represented in this examination of elevated temperature piping design. These include universities, national laboratories, piping designers and others with extensive experience in the industry.

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**Advances in Fluid-Structure Interaction—1984**, PVP Special Publication, Vol. 78, ASME, New York.

This volume is a collection of 18 papers presented at the symposium, "Recent Advances in Fluid-Structure Interaction," held at the 1984 Pressure Vessel and Piping Conference and Exhibition, June 17–21, 1984, in San Antonio, Texas.

About half the papers address interaction problems involving an exterior fluid, including vibrations of submerged structures, acoustic scattering and radiation from submerged structures, and the structural response of partially submerged structures to shock loadings. Most of these exterior problems arise in marine and naval applications. The computational techniques used for modeling the fluid include finite elements, boundary elements, infinite elements, the Helmholtz integral equation, and decoupling approximations.

The rest of the papers pertain primarily to problems in which the fluid is contained in piping systems, tanks, and other vessels. These interior fluid problems arise in nuclear power plant applications, as well as in marine, aircraft, and tank car applications. Five of these papers deal with the dynamics of piping systems, including transient water-hammer, steady-state noise transmission, and instabilities due to flow.

Sixteen of the 18 papers discuss principally analytical rather than experimental investigations, perhaps indicative of the rapid growth over the last two decades of the use of numerical techniques and the ability to model complex interdisciplinary situations. Even with all this growth, however, mathematical