Book Review

Structures Under Shock and Impact III, edited by P.S. Bulson. Published by Computational Mechanics Publications, Billerica, MA, 1994. $192.00, 600 pp.

This is the third in a series of books that serve as conference proceedings for international conferences on the title subject. The earlier conferences were held in 1989 in Cambridge, MA and in 1992 in Portsmouth, England. This book results from the third conference held in Madrid, Spain in June 1994. It contains edited versions of articles presented at the conference. A companion volume, *Shock and Impact on Structures*, edited by C. A. Brebbia and V. Sanchez–Galvez (Computational Mechanics Publications, 1994) consists of chapters written by authors at the invitation of the editors that present a state of the art of recent developments on the response of structures to impact and impulsive loading. In the United States both books are available from Computational Mechanics Inc.

The book is divided into eight major sections:

1. Response of Buildings, Walls, and Hardened Structures to Explosions
2. Concrete Slabs and Structural Components Under Shock and Impact
3. Blast Loading and Missile Impact on Steel Composite Structures
4. Penetration Mechanics and Penetrating Weapon Design
5. Projectile Impact on Armor and Laminated Plates
6. The Response of Structures in Soil
7. Blast and Impact Loads on Miscellaneous Structures
8. Wave Propagation, Shock Effects, and Fracture

Each section contains from 4 to 10 conference papers. Individual papers are 6–10 pages in length.

Several things stand out immediately on reviewing the contents. Current analytical methods (including computer codes) cannot treat problems very well involving impulsive loading of real structures, made of realistic materials such as concrete or assorted structural composites, and subjected to nonsymmetrical blast loading. Combined effects such as blast and impact cannot be treated effectively.

By contrast, many localized impact problems leading to penetration and perforation can be analyzed using empirical, analytical, and computational techniques. Both impulsive and impact loading problems would benefit from improved constitutive models for nonmetallic materials and high-resolution experiments to determine the fine details of the loading pulse and characterize conditions leading to the onset of failure.

Many practical problems can be successfully treated using discrete element and finite element methods. Many examples are given in the book. Among the finite element codes, DYNA seems firmly entrenched as the preferred Lagrangian code. This is a mixed blessing, though, because it is obvious from some of the articles that the code is being applied to problems it was never intended to solve.

Considerable experimental data is presented throughout on the response of structures to a variety of blast and impact loading. Some data on high rate behavior of structural materials may be

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found as well. This makes the book quite valuable to practicing engineers and those requiring such data to validate analytical and computational models.

The book provides an excellent summary of the state of the art in the response of structures to blast and impact loading. It should be on the shelf of every scientist and engineer working in this field. The high price, $192, is unfortunate. It contains, however, considerable material of practical interest in the experimental, analytical, and numerical study of the resistance of structures to short-duration loading that cannot be found elsewhere.

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