cluding summaries of 28 invited lectures. The complete texts of the invited lectures will appear in a hard-bound volume which is in preparation. The papers are divided into seven categories: General Theory, Metals and Composites, Geological Materials, Discontinuous Media, Concrete, Granular Materials and Aggregates, and Implementation and Evaluation. The objective of the conference was to stimulate interaction between researchers concerned with the theoretical and experimental aspects of developing constitutive models of deformable solids and those concerned with the implementation of constitutive laws in engineering analysis and design.

Many individuals who are active in the field of the conference contributed articles and, consequently, the volume provides a reasonably complete picture of the current state of development of models for describing the mechanical behavior of solids. Of course, the volume would be more valuable if it contained complete texts of the overview lectures as well as the contributed articles.

Theory of Laminar Flames. By J. D. Buckmaster and G. S. S. Ludford. Cambridge University Press, New York, 1982. 266 Pages. Price $49.50.

REVIEWED BY H. W. EMMONS[8]

A mixture of a gaseous fuel and oxidizer (air) will, if within the appropriate composition range, propagate a reaction that converts the reactants to products and produces heat and light: a flame. The process involves the diffusion of heat and reactive chemical specie from the reaction zone to the unignited mixture: the feedback of energy and specie.

The principal obstacle to the progress in the analysis of laminar combustion is the usually very complex series of chemical reactions needed for even very simple overall chemical reactions and the nonlinear nature of the Arrheneous relation for the chemical rate of each of the many chemical reactions actually occurring.

The book under review undertakes the task of introducing its readers to the progress that has been made in this analysis for very simple hypothetical forward reactions with an activation energy E in the Arrheneous formula which is very large ($E/R \gg T$). Under these conditions singular perturbation methods make it possible to attain solutions with considerable rigor and fair accuracy.

The book begins with a derivation of the required basic equations and continues with their application to a series of flame spread problems. The study of steady flame phenomena is followed by that of slowly varying flames (SVF's) and near equidiffusional flames (NEF's).

The study of nonsteady flames naturally leads to consider questions of flame stability under various perturbed conditions.

The calculation of flow fields is discussed in general terms but is presented at length for flames as discontinuities and for flames in a preassigned approach flow field. There is an occasional discussion of various known experimental facts, even a few flame photographs. These are used as suggestive of the kind of phenomena to be looked for in subsequent solutions. Various reasonable-looking flow fields are analytically reproduced, but no attempt is made to show their quantitative accuracy.

For anyone who desires to get started on the further development of the applied mathematics of problems of the laminar flow of multicomponent reacting gas mixtures, this book is superb. Anyone who is already familiar with combustion phenomena who desires to acquire a knowledge of the present status of the analytic understanding of what happens will find this book superior to the slow process of finding, critically reading, and absorbing the significance of the large number of papers now available. Anyone not familiar with combustion phenomena who wants to acquire that familiarity and the more physical and important intuitive understanding will find this book disappointing. The authors state (for a specific problem but generally applicable to the whole book) ". . .we regard the models as mathematical idealizations whose study can provide some insight into the nature of diffusion flames." And again, ". . ., which shows an early appreciation of activation-energy asymptotics (though not in the formal sense of this monograph)."

Needless to say, the reviewer made no attempt to check the correctness of the 819 equations printed in this book. Only an equation, which for some reason appeared to be wrong was checked and indeed the text formula for γ immediately following equation 60 is wrong ($\gamma = 1/(1-R/mC_p)$).

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Boundary Element Methods in Solid Mechanics. By S. L. Crouch and A. M. Starfield. Allen & Unwin, Winchester, Mass., 1983. 322 Pages. Price $30.00.

REVIEWED BY F. J. RIZZO[9]

The authors are of the opinion that boundary elements methods ". . . have not received the attention they deserve . . ." compared with finite difference and finite element methods. Chief among several reasons for this, in their view, is the apparently somewhat "abstruse" character of many of the ". . . technical papers on boundary element methods." They suggest that the mathematics often used in these papers ". . . has prevented many from seeing the simple and attractive algorithm that ultimately emerges."

From this viewpoint, the authors have produced a book in which physical interpretation and intuitive reasoning are used to the utmost. Indeed, their development is so physical and so directed toward a computational scheme that the steps in their development may significantly alter whatever previous understanding the reader may have had of the terminology "boundary element methods." This terminology, which seems well on its way to supplanting the terminology "integral equation methods" or "boundary integral equation (BIE) methods," has been, since it was introduced, an understandable choice for obvious reasons. But boundary elements always seemed to this reviewer to be at least related to integral equations, i.e., as a way of numerically solving them. In this book, however, it seems that the concept of an integral equation is not at all necessary to introduce, understand, and use boundary element methods. Indeed, integral equations are hardly mentioned until the sixth chapter (of eight) where the concept is definitely less important to the authors' purpose than that of an influence function. All of this strikes thie reviewer as astonishing! Nevertheless, the whole development in this book is interesting, lucid, and, no doubt, correct for its intended audience and purpose such that the expressed astonishment is, in the end, quite pleasant. One may disagree on the degree to which physical interpretation in such detail is necessary or even helpful in understanding boundary elements for one who would not find most of the

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Boundary elements (BE) have emerged as a powerful alternative to nite elements particularly in cases where better accuracy is required due to problems such as stress concentration or where the domain extends to innity. The most important feature of boundary elements, however, is that dierent to the nite domain methods as, e.g., the nite dierence method or the nite element method, the methodology of formulating boundary value problems as boundary integral equations describes problems only by equa-tions with known and unknown boundary states.Hence, it only requires discretization of the surface ...Â 1.1 Advantages of the Boundary Element Method. 1. Less data preparation time: This is adirect result of the â€™surface-onlyâ€™ modelling. EN2340 is a graduate level course on the theory and implementation of the finite element method for solving boundary value problems in solid mechanics. It is intended primarily to provide the background necessary to develop finite element code to model advanced materials (for which constitutive models are not available in commercial finite element software) and to implement special types of finite element, which might be needed to solve multi-physics problems. A strong background in solid mechanics is necessary. Before taking this course you should have completed at least an advanced solid mec... Finite Element Method. FEM is one of the popular numerical methods in engineering including rock mechanics. This popularity in the rock engineering comes from FEMâ€™s ability in dealing with complex material like rock mass. The method is applied for solving problems that are described by partial differential equations or that can be formulated as functional minimization [8]. Like the FDM, this is a method to represent the continuum.Â The boundary integration equation method has been introduced to stress analysis in solids in the late 60s by Rizzo and Cruse [14]. Development of BEM application in rock engineering practices have been first done in 1973 by Crouch and Fairhurst.