

The most interesting article for individuals concerned with two- and three-dimensional reactor calculations deals with alternating direction implicit methods (ADI). The authors of this article have all contributed substantially to the more efficient numerical solving of partial differential equations. This article concerns generalization of the Peaceman-Rachford and Douglas-Rachford methods and the application of these ADI methods to a general Helmholtz equation. The ADI methods are compared with variations of the successive overrelaxation methods. Almost 20 pages are devoted to presenting the results of numerical experiments involving ADI methods.

The use of combined analog-digital techniques in simulation has a history of about 10 years. This article outlines how analog and digital computers can be combined to solve dynamic systems problems and therefore should be of interest to those concerned with reactor control problems.

The final article is concerned with the information explosion and the law and vice versa. While these comments are concerned with the impact of computers on the legal profession, they are of considerable interest to anyone living in the American culture. The charts exhibiting the growth of literature in medicine, biology, and law are frightening. One can wonder if the growth of literature is equally as rapid in other technical fields such as nuclear engineering.

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*(About the Reviewer: Ward Sangren is a vice president of Computer Applications Inc. and the associate editor of the SIAM Journal. He is the author of a book on digital computers and nuclear reactor calculations. From 1956 to 1961 he was at General Atomic. Prior to that he was at Curtiss-Wright and at the Mathematics Panel of Oak Ridge National Laboratory, and was for two years an assistant professor of mathematics at Miami University.)*

**Rare Earth Research.** Collected papers presented at the second conference on rare earths in September 1961 at Glenwood Springs (Colorado). JOSEPH F. NACHMAN AND CHARLES E. LUNDIN, eds. Gordon and Breach, New York, 1962. xv + 354 pp. \$14.50.

The second important conference on recent rare earth researches was, by happy choice, held in Glenwood Springs (pop. 2,412) Colorado, which is located near the junction of the Roaring Fork and Colorado Silt Rivers, and is about a hundred miles southwest of the Rabbit Ears Range and some fifty miles west of Holy Cross Mountain.

For the further information of eastern provincials, Colorado lies west of Dodge City. The state was once noted for its gorgeous mountains; for its rich mines of precious metals, coal and iron; for its colorful saloons, each with its own Sweet Piano Nell and ladies of tarnished charms; and as the residence of an acute newspaper editor and an author of a modest but classic book on determinants. The wonder inspiring mountains and rich mines are still there; the saloons have given way to reputable universities; and the editor and the mathematician are long gone, but

will never be forgotten. This then was the setting for the second rare earth conference.

Some thirty papers—representing the efforts of over fifty authors—were presented at the conference. The subject matter ranges from the chemical and thermodynamic properties of the rare earth elements and their compounds to the physical, mechanical, and metallurgical properties of the metals and their alloys. In itself the book might well be classed as the second volume of a yearly journal on the rare earths, and a good one too. There are scorpions who complain bitterly about conference publications; but those fierce critters should be put in a bottle, after being reminded that it is better to have a score or more of unified papers under one cover than to have to search for them in a score of journals.

It is clearly impossible, in a short review, to touch on the salient points of each paper in *Rare Earth Research*. At least one paper, that of Kirkpatrick and Love, tells what the rare earth metals look like; this is a hopeful sign, for even those with long experience in chemistry and physics find that voltmeter readings are no substitute for a visual examination of an object of study. The papers originate from many university, industrial, and government laboratories, and of course from Ames. (Harvard, M.I.T., and Brookhaven seem not to be represented among the authors, and so one may surmise that their faculties were preoccupied with major national crises at the time of the conference.)

First in this well printed book is the clear and vivid introductory address which Professor F. H. Spedding (of Ames) gave at the conference. This is a welcome addition to the book in that it presents a brief account of the history of the rare earths and their theoretical and practical importance, along with a peek into the bright future for these fascinating (and sometimes irascible) elements. It would be counted as ill-tempered to complain about the address; but the present reviewers must point out that if its author were as familiar with copper, silver and gold as he is with the rare earths, he would never have claimed that the latter were as different among themselves as the former are among themselves. Why, even some two hundred years before Cleopatra was wont to dally with certain Romans while boating on the Nile, the brilliant geometer of Syracuse had already devised an acceptable method for determining the purity of the gold in a king's crown with but little more apparatus than a bath tub. To determine easily whether or not the thulium metal in a novel western pistol had been alloyed with gadolinium would probably pose a problem requiring much more knowledge and apparatus than the geometer ever dreamed of. Even access to modern undergraduate texts on chemical analysis wouldn't be of much help either.

By and large the work reported on in the book shows all signs of being of high caliber. It is fairly obvious that the scientists responsible for the many researches described are, scientifically speaking, incredibly fast guns. (This includes Professor Spedding, of Ames.) The book will be a *sine qua non* both to the specialists and to all real chemists and their handmaidens, the physicists.

While statesmen and self-styled humanitarians were quarreling over their domains and their ideologies, the more than fifty authors of *Rare Earth Research* were carefully investigating their environment, both for the satisfaction it gives to the inner mind as well as for the

promise their studies may give to man that he may no longer have to plow with sticks and live like beasts.

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*(About the Reviewers: Professor Yost, from the California Institute of Technology, is best not described by this editor lest he muddy with facts the delightful picture we fans of his conjure up. He tells us that his co-reviewer, Mrs. Margaret Sullivan Guthrie, is young, Irish, a chemistry graduate from Reed College (Oregon), and a one time resident of Colorado. For all we know, they may both be leprechauns.)*