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BOOK REVIEWS

Three-dimensional problems of the mathematical theory of elasticity and thermoelasticity, by V. D. Kupradze, T. G. Gegelia, M. O. Basheleishvili, and T. V. Burchuladze, Applied Mathematics and Mechanics, vol. 25, North-Holland, 1979, xix + 929 pp., $158.50.

The classical theory of elasticity, with which the book under review is concerned, is one of the more highly developed and satisfactory branches of mathematical physics, in that mathematical rigour and physical intuition are combined with rich results. Over the years, problems which were originally investigated for purely practical reasons have been reformulated in precise terms and have led to mathematical investigations of great interest and elegance. Unfortunately, it is not a subject which is taught nowadays in mathematics departments, even at graduate level, and many mathematicians are unaware of the stimulus that research in it during the last 150 years has given to the study of partial differential equations, singular integral equations, complex function theory, variational inequalities and bifurcation theory.

The mathematical foundations of the classical theory were laid down by Cauchy and as Truesdell, in his preface to [38], has reminded us: "For a long time it was a favourite subject of mathematicians and was regularly taught in mathematics departments. In this century both Hadamard and Hilbert lectured upon it, as had Poincaré and many others in the last. Of the mathematicians of that time who are best known for their work in what is now called 'pure' mathematics, we may collect a long list naming those who made at least one important addition to elasticity–Beltrami, Betti, G. D. Birkhoff, Cesàro, Christoffel, Clebsch, Fredholm, Hadamard, Korn, Lamé, Levi-Civita, Lipschitz, Morera, Volterra, Weingarten, Weyl." Truesdell goes on to highlight the contribution made to elasticity by distinguished Italian mathematicians who specialized in the subject: Almansi, Cerruti, Lauricella, Piola, Signorini, Somigliana and Tedone. One suspects that it is only his reluctance to name living mathematicians that causes Truesdell to omit the name of Gaetano Fichera whose own account [11] of the Italian contribution to the theory of elasticity makes fascinating reading. Nor do I think that Truesdell would object to his own name being added to the list: the rigour of his mathematical proofs, the depth of his physical insight, and the elegance of his writings put him firmly in the Italian tradition. He has certainly been one of the leaders of the renaissance of continuum mechanics.

The only national school which might lay claim to have made a contribution of the same magnitude is that of the U.S.S.R.; its contribution has been mainly to the two-dimensional theory and to the development of the attendant techniques in function theory, and also to the potential theory methods described in the book by Kupradze *et al.* A modest account of its achievements is contained within [29].

The mathematical theory of elasticity is concerned with the calculation of the strain and stress fields within a solid body when it is subject to the action