In Memoriam

Eli Sternberg

Eli Sternberg, perhaps the best known scholar in the field of elasticity during most of the past half-century, died suddenly in Pasadena, California, on October 8, 1988, shortly before his seventy-first birthday.

Sternberg was born in Vienna in 1917. He left Europe for the United States during the late 1930s, taking his bachelor's degree in civil engineering at North Carolina State University in 1941. After receiving the Ph.D. in mechanics from Illinois Institute of Technology in 1945, he remained at that institution as a member of the faculty, becoming a full professor in 1951. He left I.I.T. in 1956 to join Brown University's Division of Applied Mathematics, which had recently been developed by William Prager into one of the world's foremost centers of activity in continuum mechanics. Upon returning from sabbatical leave in Japan in 1964, Sternberg joined the faculty at the California Institute of Technology, where he spent the rest of his career, becoming Professor of Mechanics, Emeritus, in July, 1988. In addition to his sabbatical stay in Japan, he also spent academic years in the Netherlands and in Chile.

After his dissertation on elastic fields with linear kinematics but nonlinear stress-strain relations, Sternberg and his Ph.D. research adviser M. A. Sadowsky wrote several papers in the late 1940s on three-dimensional stress concentration at an ellipsoidal cavity. These papers have remained of great interest because of their relevance to issues of interest in fracture mechanics.

A 1952 paper with F. Rosenthal devoted to the elastic sphere under concentrated loads marked the beginning of Sternberg's interest in singular problems in elasticity, an interest that was to persist in a variety of contexts throughout his career. His work on concentrated loads was aimed primarily at clarifying the formulation of such problems, with special concern for questions of uniqueness.

One of the best known early papers of Sternberg, *On Saint-Venant's Principle*, appeared in 1954; in it, he gave mathematical form and proof to the version of the principle put forward shortly before by von Mises. This, too, was a subject to which Sternberg would return in later years.

Elastodynamics occupied Sternberg at various stages of his career. His paper *On the Integration of the Equations of Motion in the Classical Theory of Elasticity*, concerned with representations of the elastodynamic displacement field in terms of potentials, remains the definitive work on this subject today. Indeed, Sternberg's fascination with questions about the completeness of the many classes of displacement and stress potentials in the classical linear theory of elasticity persisted throughout his career.

Together with some of his Ph.D. students, Sternberg undertook sustained studies in thermoelasticity in the late 1950s and viscoelasticity in the 1960s. As in other areas of his research, here, too, he was concerned both with issues at the foundation of his subjects as well as with applications to specific problems of engineering interest.

In later years, Sternberg's interest turned primarily to the theory of finite elasticity, where he studied the effect of nonlinearity on singular elastostatic fields, as well as conservation laws that follow from variational principles.

A noteworthy aspect of Sternberg's career was the presence of several sustained collaborations, especially those with M. E. Gurtin (who was a Ph. D. student of Sternberg's), with J. K. Knowles and with R. Muki. The first of these was with Muki; initially, it was primarily concerned with thermal stress problems. Later, they explored the effect of couple stresses on singular fields, while later still, their interests turned to load transfer problems in fiber-reinforced composites. Shortly after the collaboration with Muki began, Gurtin and Sternberg undertook joint research over a period of several years on a variety of topics, including fundamental theorems in linear elastostatics and elastodynamics, thermoelasticity, and viscoelasticity. The collaborations with Muki and with Gurtin began at Brown; the one with Knowles, devoted primarily to singular problems and problems involving loss of equilibrium ellipticity in finite elasticity, began shortly after Sternberg came to Caltech. It was to last for nearly twenty-five years.

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Sternberg's scholarly achievements were recognized through several prestigious awards. He held Fulbright and Guggenheim Fellowships, he was a Fellow of the American Academy of Arts and Sciences, and he was elected to membership in both the National Academy of Engineering and the National Academy of Sciences. He held honorary degrees from North Carolina State University and The Technion in Israel. He received the Timoshenko Medal of the American Society of Mechanical Engineers in 1985.

Sternberg was a superb teacher whose lectures, like his research writings, were distinguished by uncommon clarity, conviction and integrity. His influence on students—even those who were not his research students—was enormous. This enviable academic legacy is aptly illustrated by a quotation taken from the acknowledgment in a recent Ph.D. dissertation written by an exceptionally able Caltech Ph.D. student for whom the research supervisor was *not* Sternberg: after expressing appreciation to the research mentor, the acknowledgment goes on to thank ". . . Professor Eli Sternberg, whose course in elasticity caused me to start thinking about mechanics in an entirely new way."

James K. Knowles
California Institute of Technology