PRESENTATION OF THE TIMOSHENKO MEDAL

to

MAURICE ANTHONY BIOT

(Introduction by R. D. Mindlin)

Mr. Chairman, Mr. President, ladies and gentlemen:

The recipient of the 1962 Timoshenko Medal has had a distinguished career spreading over an extraordinarily broad field of science and technology: including not only applied mechanics but also heat, light, sound and electricity and magnetism. The level of his work has ranged from the most highly theoretical and mathematical to practical applications and patented inventions.

Tony Biot had his early academic training at the University of Louvain, in Belgium, where he received the Bachelor's degree in Thomistic Philosophy in 1927. Then, in rapid succession, at one year intervals, he collected the degrees of Mining Engineer, Electrical Engineer and Doctor of Sciences: with enough time to spare, meanwhile, to complete the curriculum at the Louvain Institute of Economic Sciences.

Within another year, in 1932, he had come to the U.S.A. and picked up a Ph.D. degree in Aeronautical Sciences at Cal. Tech. All of these degrees, incidentally, were magna or summa cum laude.

With this early evidence of genius and with such a broad, basic training, it is not surprising that Tony Biot immediately began to push at the frontiers of knowledge and understanding.

I first met him, a couple of years later, during a summer session at the University of Michigan. In those days, young engineering teachers, of Tony's age, converged to the Ann Arbor campus from all over the country, each summer, to learn the applications of mechanics from Timoshenko, Westergaard and Southwell; and then they went back home, in the Fall, to spread the new gospel among their own students. By that time, though, Tony Biot had already published about two dozen papers.

While most of us were worrying about simple, steady state vibrations, Tony had already published some of his pioneering works on the response of structures to transient disturbances. While we were struggling with the elements of the theory of elasticity, he had already begun to publish his nonlinear, second-order theory accounting for the effects of initial stress and large rotation. When we were first being introduced to the mysteries of photoelasticity, he was an old hand -- with published papers on experimental technique and applications to thermal and shrinkage stresses by means of mathematical analogies.

The first few of his papers in soil mechanics -- on foundation pressures and consolidation -- had already appeared: as had his early works on flow of fluids and propagation of electromagnetic waves.

By this time, too, he had been awarded a number of patents -- ranging from a steering linkage mechanism, for automobiles, to the now well known scheme of aircraft nevigation based on establishing a fixed interference pattern of radio waves.

From the early 1930's until this very day, Tony Biot has been making inportant advances in all of the fields that he entered at the start of his career.

His early interest in fluids and aeronautics led to his later work in trans-sonic and supersonic aerodynamics; the three-dimensional theory of airfoil flutter and the introduction of matrix methods and generalized coordinates in aeroelasticity. He has applied his ideas of mechanical transients to the design of earthquake resistant buildings; to aircraft landing gear and to the sound emitted from stringed musical instruments. His initial papers on soil consolidation have blossomed into his general mathematical theory of porous media -- with applications to geophysical prospecting and well-logging. His recent ingenious solutions of the problems of reflection of electromagnetic and acoustic waves from rough surfaces are outgrowths of his early interest in radio waves.

His initial work on thermal stresses has developed into a major advance in irreversible thermodynamics: the conception of his generalized free energy and his entropy displacement vector made it possible for him to establish variational principles on which he based new methods for the solution of problems in heat conduction, diffusion, thermoelasticity and thermo-visco-elasticity.

These developments, combined with his long time interest in the nonlinear effects of initial stress, have culminated in his recent mathematical theory of folding of stratified rock -- with its amazingly detailed physical verification both in the laboratory and on the geological time scale.

Now, all these accomplishments have a definite structure. Fundamentally, Tony Biot has a strong consciousness of the physical world around him. He has a keen insight which enables him to recognize the essential features of a physical phenomenon and build them into a mathematical model without blindly including non-essentials. Then he has, at his fingertips, a vast array of the tools of mathematical analysis and analytical methods of approximation which he uses skillfully to extract, from the model, predictions of the hitherto unpredictable. There are all too few such men these days.

Mr. President, it is an honor for me to present to you my colleague and old friend, Maurice Anthony Biot.

November 27, 1962