Lockheed Missiles & Space Company, Inc.

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92-30/250

March 17, 1992

Dr. A. Ünal
Chair, ASME Honors and Awards Committee
1625 Alameda, Suite 404
San Jose, CA 95126

Dear Dr. Ünal,

I am pleased to support the nomination of Professor Thomas R. Kane for the Timoshenko Medal. He is exceptionally qualified to receive this medal. Professor Kane is regarded by many in the field of dynamics as the outstanding dynamicist of our time. His method for formulating equations of motion, known throughout the world as "Kane's Method," has revolutionized dynamics.

The classical methods for formulating equations of motion (for example, those of Newton, Lagrange, and Hamilton), when applied to complex mechanical systems, such as multibody spacecraft, robotic devices, and sophisticated mechanisms, require so much labor, and lead to such lengthy equations of motion, that their use in engineering practice is prohibitive. In contrast, Kane's Method, based on his novel partial angular velocities and partial velocities, leads with a minimum of labor to the simplest possible equations, thus permitting a user of the method to analyze systems that are intractable without it. His method is much easier to teach and to learn than the classical methods, and is based on ideas that are conceptually much simpler than those upon which the older methods are grounded. For these reasons, Kane's Method forms the basis of all of the best computer programs for the simulation of motions of mechanical systems.

One area where Kane's Method has resulted in particularly significant advances is computerized symbolic dynamics. I am vice-president of the commercial software company OnLine Dynamics, Inc., which produces and markets the revolutionary interactive dynamics program AUTOLEV. This program permits a user to formulate, on a desktop computer, exact, literal, nonlinear equations of motion for any type of system of rigid bodies and particles, and writes complete, ready-to-compile-link-and-run FORTRAN programs for solving the equations. AUTOLEV is used widely in the United

States and Europe, its popularity due to the fact that it provides users with dynamics capabilities unavailable with other programs. What makes AUTOLEV possible is that it is based entirely on Kane's Method; it could not do the remarkable things it does if it were based on any other method.

Professor Kane's achievements in dynamics go far beyond his development of a superior method for formulating equations of motion. His publications contain significant advances in a host of subjects, including spacecraft dynamics, robotics, ground vehicle dynamics, human body motion, and dynamics of mechanisms. Many of his publications are widely regarded as landmarks, and his textbooks on dynamics are employed in university courses of instruction throughout the world.

Professor Kane is perhaps most famous as a teacher. His courses in dynamics at Stanford University are legendary for their outstanding content and clarity. Every year some sixty graduate students complete his three-quarter course sequence in dynamics and give him the highest ratings in course surveys conducted by the Tau Beta Pi engineering honorary society. His success as a teacher is reflected by the fact that so many of his students have gone on to make names for themselves in dynamics.

The list of Timoshenko Medal winners is synonymous with extraordinary accomplishment in applied mechanics. Adding the name of Thomas R. Kane to this list will increase its distinction.

Sincerely,

David A. Levinson

David A. Levinson, Fellow ASME
Staff Engineer
Dynamics and Control Laboratory
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