

# 2003 Applied Mechanics Division Award

*Presented to*

**Dr. John O. Hallquist**

*In recognition of*

his pioneering developments of explicit  
nonlinear finite element methods and their  
worldwide dissemination in the DYNA programs

*Presented at*

**The Applied Mechanics Division Banquet**

**The 2003 International**

**Mechanical Engineering Congress**

**Washington, DC**

**November 18, 2003**

**Presiding: Pol D. Spanos**

**ASME/AMD Chair 2003-2004**



**ASME International**



**Dr. John O. Hallquist**  
Livermore Software Technical Corporation  
Livermore, CA

**J**ohn Hallquist obtained his Bachelor of Science from Western Michigan University in 1978 (magna cum laude) and his M.S. and Ph.D. from Michigan Technological University in 1971 and 1974, respectively. Upon receiving his Ph.D. he joined Lawrence Livermore National Laboratories (LLNL) where he started his work in the development of software for nonlinear finite element analysis. The programs were called DYNA, a package for explicit nonlinear finite element analysis, and NIKE for implicit nonlinear finite element analysis. John's efforts were first aimed at the support of the nations' weapons program. He was awarded the Department of Energy Award for Significant Contributions to the Nuclear Weapons Program in 1986.

He soon found that these computer programs, particularly DYNA, were of great usefulness to industry. His programs combined new finite elements, an extensive library of material laws and new contact-impact procedures in robust and versatile software, and were the backbone of the "virtual prototyping" movement that began to sweep industry at that time. He also added fully nonlinear shell and beam elements to these codes, to complement the

continuum elements; these provided a breakthrough in the ability to analyze automobile crash and many other industrial problems. His work was characterized by keen attention to the needs of users of the programs, and during his years at LLNL he was a consultant for more than 40 companies, including General Motors, Saab, Lockheed Missiles and Space Co, IBM, Control Data, Suzuki, Boeing, and British Aerospace.

This software was put in the public domain and its commercial potential was soon realized by several engineering analysis firms, who put the DYNA programs, with small modifications, on the market. Spurred on by this, John in 1989 left LLNL and founded Livermore Software and Technology Corporation to market, support and develop his software. The program, LS-DYNA, which is marketed by this company, dominates the world market for crashworthiness simulation, and they are also widely used to simulate metal forming processes, various manufacturing processes such as forging and extrusion, drop tests, bird impact on jet engine fan blades and many other nonlinear industrial problems. In the mid 1990s, when nonlinear analysis was still done mostly on supercomputers, more than 50% of all industrial supercomputer time was devoted to DYNA simulations. Today, John Hallquist is President of LSTC, and he continues to expand the capabilities, the user-friendliness and robustness of his software and to incorporate the latest research findings in finite elements and mechanics.

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# Applied Mechanics Division Award

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