Professor David J. Benson

See:
http://maeresearch.ucsd.edu/benson/
http://www.jacobsschool.ucsd.edu/faculty/faculty_bios/index.sfe?fmp_recid=63
http://imechanica.org/node/11467

Professor of Applied Mechanics
Department of Applied Mechanics and Engineering Sciences
University of California, San Diego

Education:
Doctor of Philosophy, 1983, Mechanical Engineering, University of Michigan, Ann Arbor, Michigan.
Master of Science, 1980, Mechanical Engineering, University of Michigan, Ann Arbor, Michigan.
Bachelor of Science, 1978, Mechanical Engineering, University of Michigan, Ann Arbor, Michigan.

Positions Since Ph.D.:

6/91-present: Professor, University of California, San Diego Research on computational methods for nonlinear, large deformation problems in solid mechanics. Recent research includes analysis of ductile fracture using an Eulerian finite element formulation, fundamental mechanisms in shock compaction, arbitrary Lagrangian Eulerian (ALE) and Eulerian finite element formulations, and methods for monotonic element-centered momentum advection.

5/87-6/91: Assistant Professor, University of California, San Diego Research on computational methods for nonlinear, large deformation problems in solid mechanics.

2/84-4/87: Research Engineer, Lawrence Livermore National Laboratory Nonlinear finite element research, primarily for explicit, nonlinear finite element programs such as DYNA3D. Research topics include multi-tasking, combined rigid body and finite element formulations, single surface contact for the post buckling analysis of shell structures and ALE formulations.

10/78-1/84: Principal Analyst, Mechanical Dynamics, Incorporated Consulting and software development. Principal author of ADAMS2D (Automatic Dynamic Analysis of Mechanical Systems-2D), the DRAM postprocessor, the DMP (Data Modification Program), and development work on ADAMS (3D) and DRAM (Dynamic Response of Articulated Mechanisms).

Professional Societies:
Member of American Society of Mechanical Engineers (ASME).
Member of the ASME Committee on Computing in Applied Mechanics.
Member U. S. Association of Computational Mechanics.
Member Tau Beta Pi.

Selected Publications:
Benson, D. J., "A New Two-Dimensional Flux-Limited Shock Viscosity for Impact Calculations," Computer Methods in Applied Mechanics and Engineering, Vol. 93, 1991, pp. 39-95.
Benson, D. J., "Momentum Advection on a Staggered Mesh," Journal of Computational Physics, Vol. 100, No. 1, May 1992, pp. 143-162.
Benson, D. J., "Computational Methods in Lagrangian and Eulerian Hydrocodes," Computer Methods in Applied Mechanics and Engineering, Vol. 99, 1992, pp. 235-394.
Benson, D. J., "An Analysis of Void Distribution Effects on the Dynamic Growth and Coalescence of Voids in Ductile Metals," Journal of Mechanics and Physics of Solids,Vol. 41, No. 8, 1993, pp. 1285-1308.
Benson, D. J., "An Analysis by Direct Numerical Simulation of the Effects of Particle Morphology on the Shock Compaction of Copper Powder," Modelling and Simulations in Materials Science and Engineering, 1994, Vol. 2, pp.535-550.
Benson, D. J., "Dynamic Compaction of Copper Powder: Computation and Experiment," Applied Physics Letters, July 25, 1994, Vol. 65, No. 4, pp. 418-420.

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“Isogeometric shell analysis: The Reissner–Mindlin shell”, Computer Methods in Applied Mechanics and Engineering, Vol. 199, Nos. 5-8, January 2010, pp. 276-289, Special Issue: Computational Geometry and Analysis, doi:10.1016/j.cma.2009.05.011

ABSTRACT: A Reissner–Mindlin shell formulation based on a degenerated solid is implemented for NURBS-based isogeometric analysis. The performance of the approach is examined on a set of linear elastic and nonlinear elasto-plastic benchmark examples. The analyses were performed with LS-DYNA, an industrial, general-purpose finite element code, for which a user-defined shell element capability was implemented. This new feature, to be reported on in subsequent work, allows for the use of NURBS and other non-standard discretizations in a sophisticated nonlinear analysis framework.

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“A single surface contact algorithm for the post-buckling analysis of shell structures”, Computer Methods in Applied Mechanics and Engineering, Vol. 78, No.2, January 1990, pp.141-163, doi:10.1016/0045-7825(90)90098-7

ABSTRACT: In some of our applications we are interested in how a structure behaves after it buckles. When a structure collapses completely, a single surface may buckle enough that it comes into contact with itself. The traditional approach of defining master and slave contact surfaces will not work because we do not know a priori how to partition the surface of the structure. This paper presents a contact algorithm that requires only a single surface definition for its input.