Professor Pål G. Bergan

See:
http://www.dnv.com
http://www.bookfinder.com/author/p-g-bergan/
http://umaryland.worldcat.org/identities/lccn-n78-50276

Det Norske Veritas

Selected Publications:

P. G. Bergan and T. Søreide (Institutt for statik, The Norwegian Institute of Technology, The University of Trondheim, Norway), "A comparative study of different numerical solution techniques as applied to a nonlinear structural problem", Computer Methods in Applied Mechanics and Engineering, Vol. 2, No. 2, May 1973, pp.185-201, doi:10.1016/0045-7825(73)90014-5
ABSTRACT: This paper describes and compares a number of different numerical methods frequently used in solution of nonlinear problems in structural mechanics. A simple mechanical system is chosen. By varying the geometry and the stiffness of the members, different types of nonlinear structural behavior may be simulated. A comparative study of various solution techniques applied to the sample problem is given. The solution paths followed by these methods are illustrated by use of map plots of the strain energy and the total energy of the system. Also, a new method for automatic computation of steps for incremental techniques is suggested.

P. G. Bergan and G. Horrigmoe, Incremental variational principles and finite element models for nonlinear problems, Comp. Meths. Appl. Mech. Engrg., 7, 201–217, 1976.

P. G. Bergan and L. Hanssen, A new approach for deriving 'good' finite elements, MAFELAP II Conference, Brunel University, 1975, in The Mathematics of Finite Elements and Applications – Volume II, ed. by J. R. Whiteman, Academic Press, London, 483–497, 1976.

Remseth, S., Holthe, K., Bergan, P. G. and Holand, I. (1977): "Tube buckling analysis by the finite element method", Proceeding of International Conference on Finite Elements in Non-linear Solid and Structural Mechanics, Geilo, Norway.

P. G. Bergan and T. Soreide, Solution of large displacement and instability problems using the current stiffness parameter. In Finite Elements in Non-linear Mechanics. pp. 647-669 Tapir Press 3 (1978).

Geir Horrigmoe and Pål G. Bergan (Division of Structural Mechanics, The Norwegian Institute of Technology, 7034, Trondheim-N.T.H., Norway), "Nonlinear analysis of free-form shells by flat finite elements", Computer Methods in Applied Mechanics and Engineering, Vol. 16, No. 1, October 1978, pp. 11-35, doi:10.1016/0045-7825(78)90030-0
ABSTRACT: The paper describes a general formulation for geometrically nonlinear analysis of shells using very simple flat finite elements. The approach is based on the "updated Langrangian" description of motion (co-rotational coordinates), in which the geometry of the shell structure is continuously updated during deformation to establish new reference configurations. The numerical solution technique adopted in the paper allows tracing

of the entire nonlinear load-deflection path including unstable branches in the solution space. Numerical studies are presented in order to demonstrate the accuracy and efficiency of the proposed method.

P. G. Bergan, G. Horrigmoe, B. Bråkeland and T. H. Søreide (The Norwegian Institute of Technology, The University of Trondheim, Norway), **"**Solution techniques for non-linear finite element problems**"**, International Journal for Numerical Methods in Engineering, Vol. 12, No. 11, 1978, pp. 1677–1696, doi: 10.1002/nme.1620121106
ABSTRACT: The paper presents a classification of mathematical commonly encountered in connection with solution of non-linear finite element problems. The principal methods for numerical solution of the non-linear equations are surveyed and discussed. Special emphasis is placed upon the description of an automatic load incrementation procedure with equilibrium iterations. It is shown how this algorithm can be adapted for solving problems involving instabilities, snap-through and snap-back. A simple scalar quantity denoted the current stiffness parameter is suggested; this parameter is used to characterize the overall behaviour of non-linear problems. It can also be used as a steering parameter in the solution process. The use of the present technique is illustrated by several examples.

P.G. Bergan (The Norwegian Institute of Technology, Trondheim, Norway), "Solution algorithms for nonlinear structural problems", Computers & Structures, Vol. 12, No. 4, October 1980, pp. 497-509, doi:10.1016/0045-7949(80)90125-X
ABSTRACT: The article discusses characteristic types of nonlinearities in structural systems. Various ways of illustrating such nonlinearities are suggested. Mathematical equations that form the basis for alternative numerical solution algorithms are stated. The use of the current stiffness parameter for characterizing nonlinear systems is discussed. Some new formulations and applications of this parameter are suggested. A new class of solution techniques utilizing simultaneous iteration on the loading parameter as well as the displacements is also proposed. By these techniques it is not necessary to formulate a nonlinear stiffness matrix and incrementation of displacement pattern can be used instead of load incrementation. No special load reversal criterion is normally required for passing limit points.

P. G. Bergan, Finite elements based on energy orthogonal functions, Int. J. Numer. Meth. Engrg., 15, 1141–1555, 1980.

P. G. Bergan and M. K. Nygard, Finite elements with increased freedom in choosing shape functions, Int. J. Numer. Meth. Engrg., 20, 643–664, 1984.

P. G. Bergan and C. A. Felippa, A triangular membrane element with rotational degrees of freedom, Comp. Meths. Appl. Mech. Engrg., 50, 25–69, 1985.

Storaasli, O. O., and Bergan, P., "Nonlinear Sub-structuring Method for Concurrent Processing Computers," AIAA Journal, Vol. 25, No. 6, June 1987, pp. 871-876.

P. G. Bergan and M. K. Nygard, Nonlinear shell analysis using Free Formulation finite elements, in Finite Element Methods for Nonlinear Problems, Springer Verlag, Berlin, 317-338, 1989.

M. K. Nygard and P. G. Bergan, Advances in treating large rotations for nonlinear problems, Chapter 10 in State-of the Art Surveys on Computational Mechanics, ed. by A. K. Noor and J. T. Oden, ASME, New York, 305–332, 1989.