Professor E. F. Masur

http://orlabs.oclc.org/identities/np-masur,%20e%20f

Selected Publications:

E.F. Masur, et al, “On the theory of elastic instability”, …and applied mechanics: proceedings of the…, 1960, Springer

Masur, E. F., and Chang, C. H., "Development of Boundary Layers in Buckled Plates," J. of the Engineering Mechanics Division, ASCE, 90, No. 2 (1964), 33.

Schreyer, H.L., and Masur, E.F., "Buckling of Shallow Arches", Journal of the Engineering Mechanics Division, ASCE, Vol. 92, No. EM4, August 1966, pp. 1-19.

E.F. Masur (Department of Materials Engineering University of Illinois at Chicago Circle, Chicago, Illinois 60680 USA), “Buckling, post-buckling and limit analysis of completely symmetric elastic structures”, International Journal of Solids and Structures, Vol. 6, No. 5, May 1970, pp. 587-604, doi:10.1016/0020-7683(70)90032-6
ABSTRACT: The buckling mode of a structure is defined to be symmetric if its sign is indefinite; this happens when the potential energy expansion near the buckling point does not contain terms which are cubic in the buckling mode. If, in addition, the cubic terms vanish identically for all possible modes then the structure is defined to be “completely symmetric”. Many structures of technical significance are included in this definition, such as columns, plates, frameworks, etc. If certain technically realistic order-of-magnitude assumptions are made, the analysis of the buckling and post-buckling behavior of completely symmetric structures can be carried out in great generality. For example, it is shown in the present paper that structures of this type buckle under increasing loads and are therefore insensitive to initial imperfections. The post-buckling state is characterized by the satisfaction of a minimum complementary energy principle, which represents an extension of the corresponding classical principle into the nonlinear domain. Moreover, the energy can be bracketed between upper and lower bounds and an error estimate is thus established at least in an averaging sense. Under certain circumstances the load approaches a finite value as the structure approaches collapse. This collapse load can also be bracketed between classes of “statically admissible” load parameters (representing lower bounds) and “kinematically admissible” load parameters (representing upper bounds). The gap between these bounds can be reduced arbitrarily. The example of a slender statically indeterminate beam subjected to lateral and torsional buckling is introduced to demonstrate the general principles developed in the paper.

E. F. Masur and D. L. C. Lo (University of Illinois, Chicago, Illinois), “The Shallow Arch—General Buckling, Postbuckling, and Imperfection Analysis”, Mechanics Based Design of Structures and Machines: An International Journal, Vol. 1, No. 1, 1972, pp. 91 – 112, doi: 10.1080/03601217208905335
ABSTRACT: A general discussion of the behavior of the shallow circular arch is presented. It is shown that, irrespective of specific loading or boundary conditions, it is possible to arrive at general conclusions regarding buckling, postbuckling, and imperfection sensitivity. General methods of analysis are established which lead to the determination of points of bifurcation and of postbuckling paths under symmetric loads. Modifications

accounting for antisymmetric load components are introduced, with special emphasis on their asymptotic and limit load effect.

Masur, E. F., **"Buckling of Shells—General Introduction and Review"**, Paper 2000 presented at ASCE National Structural Engineering Meeting, San Francisco, April 9-13, 1973

L. W. Glaum, T. Belytschko and E. F. Masur (Department of Materials Engineering, University of Illinois at Chicago Circle, Chicago, IL 60680, U.S.A.), "Buckling of structures with finite prebuckling deformations—a perturbation, finite element analysis", International Journal of Solids and Structures, Vol. 11, No. 9, September 1975, pp. 1023-1033, doi:10.1016/0020-7683(75)90045-1
ABSTRACT: In some technically important structures, finite prebuckling displacements have a profound effect on the bifurcation load. To ignore these displacements, as is done in most instability analyses, is to invite major errors, usually on the unsafe side. A method is presented which approximates this effect without the necessity of solving nonlinear equations. The general theory is developed for any elastic body under conservative loads. The governing equations are subsequently discretized by a finite element approach and it is shown that for planar framed structures, the second order approximation to the buckling load can be found in terms of the standard linear and geometric stiffness matrices of structural analysis; the solution procedure does not require iterations. For illustrative purposes, a computer program was developed for planar structures and the results are compared to the exact solution for the buckling of shallow circular arches.

E. F. Masur (1) and C. H. Popelar (2)
(1) Department of Materials Engineering, University of Illinois, Chicago Circle, Chicago, IL 60680, U.S.A.
(2) Department of Engineering Mechanics, Ohio State University, Columbus, OH 43210, U.S.A.
"On the use of the complementary energy in the solution of buckling problems", International Journal of Solids and Structures, Vol. 12, No. 3, 1976, pp. 203-216, doi:10.1016/0020-7683(76)90063-9
ABSTRACT: A systematic derivation of the expression for the complementary energy in elastic buckling problems is presented. Compatibility is identified with variation with respect to the stress components, and the resulting eigenvalue problem is shown to be equivalent to, and sometimes more convenient than, the corresponding formulation in terms of the potential energy. Similarly, approximate techniques may lead to better as well as simpler estimates, whose upper bound property can, however, be assured only through appropriate safeguards. The method is applied in some detail to buckling of columns of arbitrary boundary conditions and axial force distribution. Another example is the problem of lateral beam buckling, with the effect of warping restraint included. In both cases (and presumably in many others) the complementary energy formulation is of lower order than the conventional potential energy formulation, and it is clear that the same simplification should also apply to finite elements or other discrete formats. The method is restricted to the (technically significant) case of a linear prebuckling state.