Addendum - Layout optimization of structures

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Introduction

After the publication of the above article in *Applied Mechanics Reviews* (February, 1995), it was brought to the authors' attention that some important results in this field have been omitted from the review. This omission is being corrected in a brief Addendum.

Dynamic stiffening

The optimal location and layout of stiffeners in dynamic problems was studied by Laura *et al* (1991, 1992, 1994), Rossi and Laura (1993), and Laura (1994).

Optimal design of trusses

Truss optimization for multiple loads was also discussed by McKeown (1974, 1977, 1989), who solved these problems via sequences of optimal fixed displacement structures.

Generalized shape optimization of bars in torsion

It has been brought to the authors' attention that some important early work on generalized shape optimization was not mentioned in the original review. The earliest publication was a paper on nonhomogeneous bars of maximum rigidity in torsion (Lurie and Cherkaev 1978), with an extended version by Lavrov *et al* (1980).

Another important development in elastic torsion was presented by Gibianski and Cherkaev (1988), who introduced a very special type of elasto-plastic laminate composed of entirely elastic and entirely plastic layers.

Orthotropic plates

One of the first successful attempts to obtain necessary conditions in optimizing anisotropic plates is due to Fedorov and Cherkaev (1983).

General aspects of structural optimization

In an early book of Lurie (**1975**), many original results obtained in 1970-1971 were presented, including the basic idea of composites as artificial formations arising from what we now call generalized shape optimization. This approach was discussed extensively in this book, together with an effective mathematical implementation of optimizing the generalized shape of conducting material in two dimensions.

Qualifications of a statement

In including the above Russian research group amongst the "research associates" of Olhoff *et al* (p 88 of the original article), the authors merely meant to say that there was some joint research activity between Lurie's group and the Danish team, which can also be seen from publications. This was not meant to imply administrative superiority, let alone intellectual leadership, of the Danish group.

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This concept is applied to structural topology optimization with large numbers of design variables. In traditional genetic algorithms, the chromosome length is determined when the phenotype is encoded into a genotype.Â Haftka7 and Kwak8 reviewed structural optimization methods and shape sensitivity analysis. Michell9 first studied structural topology optimization and obtained the analytical solution, called Michell trusses, which have infinite numbers of truss members.Â DeRose and Diaz17 developed a meshless, wavelet-based layout optimization method. In order to overcome the problems of mesh degradation in convergence for large-scale layout optimization problem, a fictitious domain and a wavelet-Galerkin technique were used. Discontinuity layout optimization (DLO) is an engineering analysis procedure which can be used to directly establish the amount of load that can be carried by a solid or structure prior to collapse. Using DLO the layout of failure planes, or 'discontinuities', in a collapsing solid or structure are identified using mathematical optimization methods (hence the name, 'discontinuity layout optimization'). It is assumed that failure occurs in a ductile or 'plastic' manner. Applied Mechanics Reviews (APPL MECH REV). Publisher: American Society of Mechanical Engineers. Journal description. AMR is an international review journal covering mechanics topics across the engineering sciences spectrum, such as fluid and solid mechanics, heat transfer, dynamics and vibration.Â Topics addressed include hydrodynamic stability theory and coherent structures; dynamics of energy transfers among different scales of motion; nonlinear development of amplitude; development of single-frequency coherent mode; fundamental-subharmonic interaction and vortex pairing; and reversal of Reynolds stresses. Topology Optimization in Structural Mechanics pp 237-322 | Cite as. Topology and Reinforcement Layout Optimization of Disk, Plate, and Shell Structures. Authors. Authors and affiliations.Â A Model for Layout Optimization of Plate Structures. In Pedersen, P, editor, Optimal Design with Advanced Materials, pages 337â€“350, Lyngby, Denmark, 1993. Elsevier, Amsterdam, The Netherlands, 1993.Google Scholar.Â Applied Optimal Control Theory of Distributed Systems. Plenum Press, New York,USA, 1993.CrossRefzbMATHGoogle Scholar. [27]. This paper investigates the structural design optimization to cover both the reliability and robustness under uncertainty in design variables. The main objective is to improve the efficiency of the optimization process. To address this problem, a hybrid reliability-based robust design optimization (RRDO) method is proposed.Â D. M. Frangopol and K. Maute, â€œLife-cycle reliability-based optimization of civil and aerospace structures,â€ Computers and Structures, vol. 81, no. 7, pp. 397â€“410, 2003. View at: Publisher Site | Google Scholar. R. M. Paiva, A. Carvalho, and C. Crawford, â€œA robust and reliability based design optimization framework for wing design,â€ in Proceedings of the 2nd International Conference on Engineering Optimization, Lisbon, Portugal, 2010.