1036-06-38 **R E Skelton*** (bobskelton@ucsd.edu), MAE Dept, 9500 Gilman Dr, UCSD, La Jolla, CA 93093.
Optimal Tensegrity Systems.

This paper provides the closed form analytical solution to the problem of minimizing material volume subject to material yield constraints in the presence of bending loads. The optimal solution is a class 2 tensegrity structure and the solution is expressed in terms of two variables, the aspect ratio, ρ, and complexity of the structure, q. The total number of members of the structure is equal to $2(1 + 2 + 3 + ...q))$. The minimal material volume (normalized) is also given in closed form by a simple function of ρ and q. The forces for this nonlinear problem are shown to satisfy a linear recursive equation, from node-to-node of the structure. All member lengths are specified by a linear recursive equation, dependent only on the initial conditions involving a user specified length of the structure. Our results generate the 1904 results of Michell in the special case when the complexity q approaches infinity. (Received December 10, 2007)