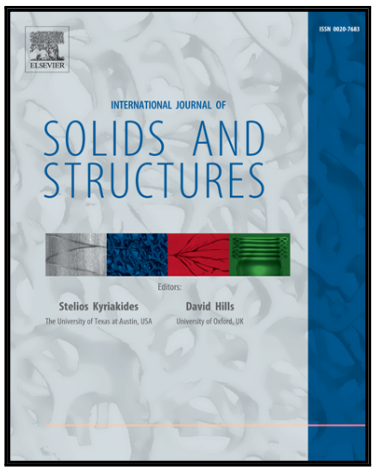

A dynamic-relaxation formulation for analysis of cable structures with sliding-induced friction

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A dynamic-relaxation formulation for analysis of cable structures with sliding-induced friction

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Structure of the paper

Abstract

In many cable structures, special types of joints are designed to allow cables to slide freely along the joints. Thus, a number of discrete cable elements are substituted by a single continuous cable that slides over multiple nodes. Continuous cables are employed in engineering applications such as cranes, domes, tensioned membranes and tensegrity structures. Most studies involve the assumption of frictionless movement of cable elements through pulleys. Nevertheless, frictionless sliding is usually an unrealistic hypothesis. In this paper, the dynamic relaxation (DR) method is extended to accommodate friction effects in tensioned structures that include continuous cables. The applicability of this DR formulation is demonstrated through analysis of three case studies that involve both numerical and experimental investigation. Results show potential to efficiently accommodate sliding-induced friction.

Keywords: sliding cables, friction effects, cable structures, dynamic relaxation.