

INVERSE DETERMINATION OF THE FIRST TWO NATURAL FREQUENCIES OF A SIMPLIFIED BEAM–TENDON DYNAMIC MODEL

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Abstract

This paper presents the formulation of an inverse problem aimed at determining the parameters of a simplified dynamic model representing the interaction between a pre-stressed beam and its tendon. The simplified model possesses two degrees of freedom and contains unknown parameters associated with the effective stiffness participation of the tendon. These parameters are determined such that the first two natural frequencies of the simplified model coincide with those obtained from a high-fidelity finite element model (FEM). The inverse identification problem is formulated as a nonlinear system derived from the eigenvalue problem of the simplified dynamic model. The resulting system is solved using an iterative numerical procedure. A numerical example based on FEM frequencies of 53 Hz and 131 Hz is presented. The results demonstrate that the simplified model can accurately reproduce the dominant dynamic characteristics of the full FEM model.