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Real-Time Characterization of Aerospace Structures Using Onboard Strain Measurement Technologies and Inverse Finite Element Method

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The inverse problem of real-time reconstruction of full-field structural displacements, strains, and stresses is addressed using an inverse finite element method based on shear deformable shell finite element technology. Utilizing surface strain measurements from strain sensors mounted on load-carrying structural components, the methodology enables accurate computations of the three-dimensional displacement field for a general built-up shell structure undergoing multi-axial deformations. The strain and stress computations are then carried out at the element level using strain-displacement and constitutive relations. This high fidelity computational technology is essential for providing feedback to the actuation and control systems of the next generation of aerospace vehicles, and for assessing realtime internal loads and structural integrity.

Ключевые слова:

Содержание.

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