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SMART WING SUPERSONIC AND HYPERSONIC AEROELASTICITY

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Abstract: In the present paper, aeroelastic phenomena of a smart wing in supersonic and hypersonic flows are investigated to represent the flutter alleviation due to piezoelectric effect. Using nonlinear aerodynamic model, a smart wing with pitch and plunge DOFs is simulated. The equations of motion can be obtained by using the Lagrange's equations and the Kirchhoff's law. To calculate aerodynamic forces acting on the smart wing in supersonic flow, piston theory can be implemented to model airflow by a quasi-steady compressible method. The complete nonlinear aeroelastic smart wing system can be obtained and divergence and flutter speeds are calculated accordingly.