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AERO-THERMOELASTIC BEHAVIOR OF SMART-SKIN STRUCTURES IN SUPERSONIC AIRFLOWS

Seok-Hyeon Kang and Ji-Hwan Kim*

Department of Mechanical and Aerospace Engineering, Seoul National University,
Gwanak-ro 1, Gwanak-gu, Seoul, 08826, Republic of Korea
ataracia702@snu.ac.kr, jwhkim@snu.ac.kr

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Advanced military aerospace vehicles in supersonic airflows have been developed with antenna and radar structures. In this regards, smart-skin antenna models include the laminated panels with dielectric and honeycomb core layers. Hence, the skins reduce the weight of the structure as well as improve the role for stealth functions. Thus, the parts frequently experience the thermal flutter behaviour, and then the structures are involved the instability due to the thermal-structural interactions.

Kouchakzadeh *et al.* [1] investigated the nonlinear aero-elasticity of a general form of laminated composite plate in supersonic airflow. Further, Kuo *et al.* [2] performed the frequency and time domain analysis using the finite element method for the flutter behaviour of structures. While, Ibrahim *et al.* [3] provided the nonlinear flutter response of hybrid composite plates under the thermal and aerodynamic loads.

In this work, smart-skin structure is investigated to improve the role of the structure. Figure presents a schematic diagram of smart skin model. The model is assumed as composite sandwich structure, and the First-order Shear Deformation Theory (FSDT) of plate is adopted. And then, the von Karman theory is used for strain-displacement relations. The governing equations are obtained from the principle of virtual work, and further adopted the finite element formulations to obtain the results for aero-thermo-elastic behaviour.

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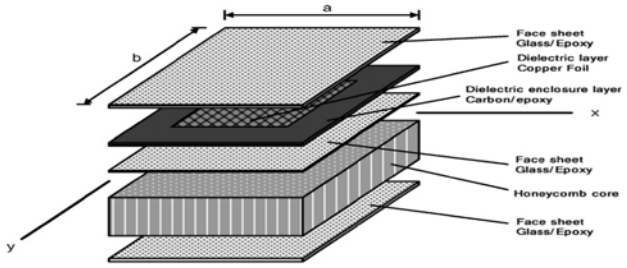

Simplified model of smart skin structure