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**High-power laser resistance of filled sandwich panel with truss core: an  
experimental study**

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**Abstract** We reported a new function of sandwich panels with truss cores, i.e., superior performance under intense local heat flux induced by continuous wave laser. To further enhance the laser resistance, lightweight ablative material and thermal insulation material are filled in the sandwich panel respectively. A dimensional analysis is developed to find core filler materials with appropriate properties. Experiments show that sandwich panels filled with the compound of silicone resin and carbon powder, a typical ablative material, and porous ceramic, a typical thermal insulation material significantly improve the local heat flux resistance compared with monolithic plates and unfilled sandwich panels. The full-field temperature history and dynamic damage evolution of the back surface are recorded and compared, and the failure time to reach the melting point is prolonged in the following order: monolithic plate, unfilled sandwich panel, sandwich panel filled with ceramic, sandwich panel filled with the compound of silicone resin and carbon powder. Considering the lightweight design requirement of such structures, resistance in relation to specific weight is also evaluated and discussed.

**Keywords** laser resistance, sandwich panel, thermal insulation, lightweight structure, failure point

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