

THERMAL-RELATED STRUCTURAL DESIGN AND OPTIMIZATION

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PROPOSAL

Scope of the mini-symposium: Nowadays structural performance in thermo-mechanical coupling environments has become a critical issue for many high-tech products and instruments. With the help of high performance computational method, thermal systems with superior performance can be designed in an efficient way. The topic of the present mini-symposium is about the new simulation-based design and optimization methods for thermal structures, which includes (but not limited to) numerical simulation technology on TPS and Hot structure; topology optimization for thermal structures under thermo-mechanical coupling environment; multi-scale design and optimization of thermal systems; multi-functional design of thermal-protected ultra-light structures and materials; designing heat dissipation/isolation structures, V&V (verification and validation) in TPS design, etc.

Importance and applications: Simulation-based design and optimization methods are extremely important to accelerate the design cycle and reduce the developing cost of thermal structures. Designing high performance structures under thermo-mechanical coupling environment always involves the considerations of thermal stress, thermal buckling, temperature-induced material degradation, creep and phase transformation and their coupling with thermal field. These effects can only be considered seriously in the design and optimization process by resorting to numerical simulation methods. Furthermore, novel configurations of macro thermal structures and new kinds of thermal-related materials can also be obtained through the application of optimization methods.

REFERENCES

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