Paper ID: 24958
oral

MATERIALS AND STRUCTURES SYMPOSIUM (C2)
Advanced Materials and Structures for High Temperature Applications (4)

Author: Mr. Zhenqiang Wu
Beijing Institute of Structure and Environment Engineering, China, wuzhenqiang@126.com

DYNAMIC RESPONSE TESTING AND ANALYSIS OF HYPERSONIC AIRCRAFT PANELS EXCITED BY HIGH-INTENSITY ACOUSTIC LOADS IN THERMAL ENVIRONMENT

Abstract

Metallic and ceramic matrix composite panels are the major structural components for thermal protection system and hot structure of hypersonic aircraftwhich are exposed to a severe combination of aerodynamic, thermal and acoustic environments during hypersonic flights. It presents a significant challenge for the integrity and the durability for these structures. In this research, some typical metallic and ceramic matrix composite panels are designed. Then, a series of dynamic response tests of these panels are carried out using a thermal-acoustic apparatus. The temperature of the metallic specimen is up to 500, and the temperature of the composite specimen is up to 800. Moreover, the exciting acoustic load is over 160 dB. Acceleration responses of these testing panels are measured using high temperature instruments during the testing process. Results show that the acceleration root mean square values are dominated by sound pressure level of acoustic loads. Compared with testing data in room temperature, the peaks of the acceleration dynamic response shifts obviously to the high frequency in thermal environment. These results are very vital for optimization designs and anti-acoustic evaluation of aircraft structures.