

IAF MATERIALS AND STRUCTURES SYMPOSIUM (C2)  
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THE ROLE OF SELF-CALIBRATING AND REDUNDANT SENSORS IN VIBRATION MONITORING  
OF AEROSPACE STRUCTURES

**Abstract**

The next generation of aerospace structure will be able to autonomously operate basing each decision on the state and evolution of their health and the change of the surrounding environment. This type of autonomous thinking can be obtained through the general path that transforms data into information, information into knowledge, and knowledge into intelligent management. In the light of this framework, a pivotal feature is the real-time estimation of capabilities from sensor measurements. To achieve this goal, this study presents an innovative smart vibration sensor able to monitor the dynamic behaviour of a system in real time, in an attempt to operate it in structural health monitoring (SHM) applications. This sensor has two main novelty. The first, the sensor is self-calibrating, this feature is a direct consequence of the idea derived from the patents hold by SEQUOIA IT. The second, a redundant sensors outline is proposed for vibration determination. The redundant sensor has two sensing elements, a piezo and a MEMS, whose reading will be compared to assure a safe result. The sensing elements are based on different technologies, in such a way to avoid the influence of external disturbs and common cause failures. The presented results proved the effectiveness of this sensor in the smart monitoring of aerospace structures vibrations.