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The smart structure concept in aeronautics – is it still there?

In the end of eighties the application of smart structure concept was attracted great interest of people working in aeronautics. The various forms of application were investigated: vibration control, noise reduction, performance improvement, systems for health and usage monitoring, integrating avionics into structures etc. At the conferences in aeronautics the great amount of papers were presented. Recently this interest seems to reduce (compare for instance ICAS Conference Proceedings 1998, 2000).

In authors opinion these result from some kind of disappointment among researchers, as (with some exceptions) the (expected before) spectacular results have not been achieved yet. But it is also the result of the discipline maturing, placing the research interest at the stable level and stepping some research down into companies which are not willing to publish their achievements.

The application of smart structures in the aeronautics has two aspects: one specific to this field of technology and the general one, common to all other fields.

The specific aeronautical application may be divided in three groups: space, fixed wing (airplanes) and rotary wing (helicopters). In *aerospace* the main interest are the dynamic phenomena, i.e. including inertia, stiffness and structural dumping in space environment. In *aircraft* (airplanes and helicopters) the aerodynamic loads, usually difficult to treat mathematically play an important role, and may cause aeroelastic phenomena. Avoiding of undesired effects of coupling aerodynamic, inertia and stiffness loads or using them in a useful way seems to be the main specific aspect of aeronautical application of smart structures.

The results of fundamental research done in the other fields of technology, which may find application in aeronautics are the material properties, embedding the “smart materials” into existing structure, control methods and algorithms.

The relation between these two aspects of aeronautical application of smart structures will be considered during the lecture, suggesting the answer on the question in the title.