

# **An Institute for Smart Materials, Structures and Machines for Swansea?**

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The demands on engineering products for better performance, lower weight, lower cost, longer life and greater efficiency are increasing. One response is the drive to integrate functionality, such as sensing, actuation, adaptation, self-repair and computation, into structures, devices and machines, often based on novel materials. This general area is termed smart materials and structures, and the design of these integrated systems requires a multidisciplinary approach. The first part of the presentation will give an overview of the diverse range of smart technologies, including the speaker's recent projects in morphing aircraft, vibration control and structural health monitoring. The technologies include piezoceramics, shape memory alloys and polymers, auxetic materials, magneto- and electro-rheological fluids, composite structures, among many others. The applications are equally wide, including aerospace, automotive and medical.

The second purpose of this seminar is to initiate collaboration in smart materials, structures, machines and devices at Swansea University. Although there is limited activity in smart technologies, there is a core of expertise in the underlying technologies, such as material engineering, numerical methods, rheology, communications, microelectronics, nanotechnology, printing, and so on. Some initial technical areas and funding opportunities will be suggested, although the objective is to encourage dialogue and discussion, and to gauge the interest in developing these ideas further.

**Professor Friswell** joined Swansea University on 1 January 2009 as Professor of Aerospace Structures. From 2002 to 2008 he was the Sir George White Professor of Aerospace Engineering at Bristol University, and from 1993 to 2002 he was lecturer, senior lecturer, reader and professor at the University of Wales Swansea. He has held a Royal Society-Wolfson Research Merit Award (2002-2007), and an EPSRC Advanced Research Fellowship (1996-2001). Prof. Friswell has a wide range of research interests, primarily involving structural dynamics although recently expanding to morphing aircraft. His long term and continuing interests include the improvement of finite element models using measured data, structural health monitoring, rotating machinery dynamics, model reduction methods, damping, non-linear dynamics, acoustic emission and active vibration control. From 2005-2008 he was awarded a Marie-Curie Excellence Grant in Morphing Aircraft which investigated various methods of introducing compliance into aircraft structures (aeroelastic tailoring, bistable structures, topology optimization) and the design of novel control effectors. Further details are available at <http://michael.friswell.com/>