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## TITLE

**Evaluating Simulation Techniques for Sensorial Materials**

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## JOURNAL/CONFERENCE

Symposium A : From embedded sensors to sensorial materials of the E-MRS 2010 Spring Meeting, which will be held at the Congress Center in Strasbourg (France) from June 7 to 11, 2010

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## ABSTRACT

Copying nature, engineering science aims at providing technical structures with an analogue of a nervous system in terms of networks of sensors, communication facilities linking these and specific hardware as well as computational methods to derive meaning from their combined signals. For the latter task, artificial intelligence approaches constantly gain importance; the more so as the trend of ever increasing sensor network size and density suggests that sensor and structure may soon become one, forming a sensorial material. Current simulation techniques capture many aspects of sensor networks and structures. For decision making and communication, multi agent based simulation (MABS) is an accepted method, as is finite element analysis (FEA) for structural behaviour.

To take advantage of developments in sensorisation and gain knowledge of what sensorial materials mean, a monitoring system was designed which is able to deduce the loads applied as well as violations of design rules from sensor information and structural subsystem response. The concept behind this is that instead of having been designed to loads and tested to conditions, the structural model, and, in its physical realisation, the material or structure, can experience and report design constraint violations. We present first results of the modelling and simulation approach obtained in experiments done with a strain gauge equipped plate using optical surface metrology to gain reference values of local strain.