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Nondestructive Characterization of Materials in Aging Systems

Symposium held November 30–December 4, 1997, Boston, Massachusetts, U.S.A.

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Current eco-
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PREFACE

Current economics often dictate the use of structures well beyond their design lives. Today, there is an increased reliance on nondestructive evaluation (NDE) to provide accurate data about the health of materials in these aging structures. Symposium JJ from the 1997 MRS Fall Meeting, "Nondestructive Characterization of Materials in Aging Systems," brought together a wide range of scientists working to develop new NDE techniques for aging materials. Materials conditions key to the assessment of structural health include the location and size of cracks, extent of water absorption in adhesives and other polymers, neutron-induced losses of fracture toughness in reactor steels, and weathering of concrete, to name a few. Many new techniques are being examined for this purpose. Papers covering a wide range of characterization technologies and structural applications were presented. Special emphasis was given to the structural health of concrete, defects in high-strength aircraft materials and the characterization of steels in nuclear reactors.

Invited papers include the following diverse set of topics:

- emerging technologies for NDE of aging aircraft structures
- the application of dielectric analysis to detect aging in adhesive bonds
- epoxy cure monitoring using an interdigitated gate Transistor transistor (IGFET)
- monitoring the structural health of runway concrete with the rolling dynamic deflectometer (RDD)
- monitoring fatigue damage in concrete with fiber-optic sensors
- the application of NDE to measure the embrittlement of reactor pressure vessel (RPV) steels
- use of computed tomography (CT) to characterize microcracking in mortar
- MEMS for structural health monitoring

One intriguing new technology, borrowed from the semiconductor industry, is the use of very small micro-electro-mechanical systems (MEMS) to monitor materials properties *in situ*. Using these devices in networks should permit both real-time monitoring of materials properties during operation and the anticipation of component failure.

The symposium was attended by leading researchers in the field of materials characterization from the United States, United Kingdom, Kazakstan, Germany, France, Russia, Japan and Luxumborg. The papers in this proceedings highlight the diversity of research dedicated to the properties of materials in aging systems.

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