

CLIMATE INDUCED RESPONSE OF PAINTED WOOD SURFACES: MONITORING BY LASER TECHNIQUES

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Laser speckle interferometry is a full-field, non-contact experimental measuring technique that allows rapid and highly accurate measurements of the 3D deformation and the strain/stress distribution. This method is used to map the formation and development of damages to decorative layers on wood induced by variations in relative humidity (RH) in its environment. Specimens of wood coated with gesso and paint imitating the historic objects will be subjected first to real RH fluctuations in a climatic chamber, then to cycles of mechanically produced dimensional changes simulating the responses to climatic fluctuations. The speckle patterns recorded before and after deformation of the object yield a characteristic fringe pattern containing full required information. The goal of the investigations is to identify the critical RH levels dangerous for the polychrome wood as a function of the amplitude, duration and starting level of the RH change and number of such changes. The ESPI method was found to trace precisely cracks and delamination of the paint layer. Sound-induced vibration of the surface proved very effective in characterizing extent and mechanical properties of the delaminations.

ACKNOWLEDGMENTS

This research was supported from the sources of Financial Mechanism of the European Economic Area. Further support from the Polish Ministry of Science and Higher Education, grant POL-POSTDOC II PBZ/MEiN/01/2006/10 is acknowledged.