

Damage assessment in composite powerboat using electromechanical impedance method

W. Ostachowicz*, T. Wandowski*, P. Malinowski*, B. Puchowski†

* Institute of Fluid-Flow Machinery
Polish Academy of Sciences
Fiszera 14, 80-231 Gdansk, Poland
e-mail: wieslaw@imp.gda.pl, web page: <http://www.imp.gda.pl>

† CreeYacht
Platynowa 16, 84-123 Rekowo Gorne, Poland
email: bartosz@creeyacht.pl, web page: <http://www.creeyacht.pl>

ABSTRACT

In this paper authors present results of application of electromechanical impedance (EMI) method for damage assessment in composite materials. The EMI method is based on measurements of electrical parameters of piezoelectric transducer bonded on the structure surface or embedded inside. The electromechanical coupling results in influence of structure changes on electrical characteristics of the piezoelectric transducers. Changes in mechanical resonant frequencies of structure could be caused by damage. In the problems of damage detection using EMI method such electrical parameters like real parts of impedance or admittance of piezoelectric transducer are studied. In this research composite material in the form of Glass Fiber Reinforced Polymer GFRP was investigated. GFRP composites are very often utilized in maritime structures like boat and yachts. Research was conducted for simple GFRP panels and for the case of composite powerboat. Authors investigated influence of damage as well as effects of sensor bonding, varying ambient temperature and water immersion of the composite structure. Numerical indexes were developed for the assessment of damage state of the investigated structures.