



PYROEFFECTS ON MULTIPHASE MAGNETO-ELECTRO-ELASTIC SENSOR PATCH BONDED ON MILD STEEL PLATE

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Abstract- The magneto-electro-elastic (MEE) material under thermal environment exhibits pyroelectric and pyromagnetic coefficients resulting in pyroeffects such as pyroelectric and pyromagnetic. The pyroelectric and pyromagnetic effects on the behavior of multiphase MEE sensors bonded on the top surface of a mild steel plate under thermal environment is presented in this paper. The aim of the study is to investigate how samples having different volume fractions of the multiphase MEE sensor behave due to pyroeffects using finite element method. This is studied at an optimal location on the plate, where the maximum electric and magnetic potentials of the MEE sensor are induced due to pyroeffects under various boundary conditions. It is assumed that plate and sensor are perfectly bonded to each other. The maximum pyroelectric and pyromagnetic effects on electric and magnetic potentials are observed when volume fraction is $v_f = 0.2$. Additionally, the boundary conditions significantly influence the pyroelectric and pyromagnetic effects on electric and magnetic potentials of the sensor.

Index terms: magneto-electro-elastic sensor, pyroelectric, pyromagnetic, finite element.