

**AN INNOVATIVE INTELLIGENT SYSTEM FOR FAULT  
DETECTION IN TOKAMAK MACHINES\***

A. Gallo, Dees -Univ. Catania; L. Fortuna, Dees -Univ. Catania; A. Rizzo, M.G. Xibilia,  
Dees -Univ. Catania

\* Paper supported by MURST project "Identification and Control of Industrial Systems"

In this paper, a new fault detection strategy, based on soft computing techniques, able to isolate and classify some faults occurring in a tokamak fusion plant is described. In particular, attention is focused on faults occurring in measurements of vertical stresses during plasma disruptions. The strategy is based on a neural model which estimates suitable features of the expected sensor response, allowing to isolate the most frequently occurring faults, together with a fuzzy inference system able to classify the detected faults. The proposed strategy has been validated at JET, the Joint European Torus, on several disruptions, and it is currently used for fault detection purposes. A comparison with traditional fault detection techniques implemented at JET has shown a great improvement, because of the great precision in detecting sensor faults, the ability in discriminating among different faults, and the high degree of automation achieved.