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Fuzzy Reliability Model for Predicting Lifetime of Welded Joints

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Abstract: The advanced high strength steel of first generation TRIP (Transformation Induced Plasticity) has been proposed to be used in automotive industries due to its impact resistance as well as reduced weight. But it represents a great challenge for welding technologies, specifically for GMAW process. There are some variations in heat input which affects directly the lifetime of welding joints. In that sense, it is of interest to assess the resistance of welding joints by means of fatigue tests in order to measure the heat input effect over the joints reliability and lifetime. Usually, it is not possible to record enough data to make this inference which causes uncertainty and possibly wrong conclusions related to the hypothesis tests. Thus, in this work a model based in fuzzy numbers is proposed for considering the uncertainty information. Moreover, this fuzzy theory to the reliability analysis was adapted to estimate some faculties: the fuzzy reliability and the fuzzy mean life of welded joints.

Keywords: GMAW, Fatigue, Accelerated Life Tests, Fuzzy Reliability, Fuzzy Regression