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MULTI-CRITERIA ESTIMATION OF DOUBLE-ELLIPSOIDAL HEAT SOURCE PARAMETERS FOR NUMERICAL SIMULATION OF WELDING PROCESS

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ABSTRACT

The results of welding simulation models depend heavily on the input parameters, particularly on the parameters of the heat source model. In this study, we present a method for estimation of the heat source parameters for a three-dimensional quasi-stationary heat transfer model for gas metal arc welding. In the case of a double-ellipsoidal heat source, five parameters are commonly used, the values for which are primarily determined by the researcher's experience. This approach can be a source of error; to estimate these values and to reduce computational time, we applied a calibration procedure using a Taguchi-based set of simulation results from the numerical model. In combination with grey relational analysis and two objective functions based on weld geometry, this approach showed very good results considering the matching between simulation and experimental results.

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