عنوان مقاله:

Investigating the Effect of Joint Geometry of the Gas Tungsten Arc Welding Process on the Residual Stress and Distortion using the Finite Element Method

محل انتشار:

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خلاصه مقاله:

Although a few models have been proposed for 3D simulation of different welding processes, 2D models are still more effective in design goals, thus more popular due to the short-time analysis. In this research, replacing time by the third dimension of place , the gas tungsten arc welding process was simulated by the finite element method in two dimensions and in a short time with acceptable accuracy in two steps (non-coupled thermal and mechanical analysis). A new method was proposed for applying initial conditions using temperature values calculated in the preceding step of the solution; this trick reduces nonlinear effects of birth of elements and considerably reduces analysis time. A new parameter was defined for determining thermal boundary conditions to determine the contribution of the imposed surface and volumetric thermal loads. The effect of weld joint geometry on residual stresses and distortion was studied based on a validated simulation program. Results suggest that changing the joint geometry from V-into X-groove, the maximum values of residual stress and distortion are reduced by 20% and 15%, respectively.

کلمات کلیدی:

Gas tungsten arc welding, Joint geometry, Residual stress, Distortion, Finite Element Method