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Simulation of multipass welding of a thick plate. (English) Zbl 0927.74069

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Summary: We simulate numerically multipass butt welding of a very thick steel plate. Transient temperatures and residual stresses have been measured, and the agreement between calculations and experiments is good. Two different approaches, quiet and inactive elements, for modelling multipass welding are compared. The first approach is straightforward to apply in most finite element codes. The inactive element method requires a code that can regenerate the finite element model automatically, or otherwise very tedious manual work is necessary as the elements are added to the model when welds are laid. It is shown that both techniques give the same results, but the computational effort is reduced by using inactive elements. It also circumvents the problem in the quiet element approach of choosing properties of elements in the model that represent the case when welds are not laid.

MSC:

74S05 Finite element methods applied to problems in solid mechanics

74M15 Contact in solid mechanics

80A20 Heat and mass transfer, heat flow (MSC2010)

Cited in 8 Documents

Keywords:

residual stresses; hole drilling; strain gauge method; quiet element method; inactive element method

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