

SIMULATION MODEL OF INITIAL PERIOD OF SPOT WELDING

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ABSTRACT

Temperature field and its changes over time is significant representative of all structural subprocesses sequences of spot welding not only for simulation purposes. This article affirms the definition of the initial period of welding, its importance in the spot welding simulation and method of determining the appearance and temperature fields, showing the possibilities of the analysis process on the basis of various forms of interpretation.

INTRODUCTION

Mathematical identification (analytical and numerical) of temperature fields is a tool that in correlation with the experimentally verified data, complements calculation methods for welded construction, and significantly increases the quality of projected technology and, ultimately, expand the capabilities of management processes and creating new generations of production machine. As a result of carried out mathematical analysis, partial differential equations are obtained, usually, such a complexity that significantly hinders their solution if certain assumptions (approximations) that reduce them to solvable form are not introduced.

For initial period of spot welding is characteristic that the heat exchange between neighboring particles (layers), in homogeneous and isotropic environment, taking place exclusively by conduction. All physical properties (material properties), depend on temperature and volume changes are limited and negligible small. Electrodes are considered as rigid bodies.

Starting discrete moment of welding (initial period) is considered in the conditions of stationary heat exchange (energy exchange). This implies that all physical properties are dependent on position (coordinates), but not on the time. Non-stationary course of the process of heating and cooling is discretized at equal time increments so that initial period is understood as the first time increment of process. According to the law of conservation of energy, heat balance for the elementary is:

$$\sum_{i=1}^n q_i \rightarrow 0 \quad (1)$$