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MAGNETIC FORCES AND CURRENTS OF THE INDUCTOR FOR MAGNETIC-PULSE PROCESSING OF WELDING JOINTS OF NON-MAGNETIC THIN SHEET METALS

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Abstract

In order to eliminate residual stresses in the welds of thin-sheet non-magnetic metals, the possibility of using magnetic pulse processing is considered. An electromagnetic inductor with a U-shaped magnetic circuit and two coils of solid conductor is considered. To create a unipolar current pulse in the inductor winding, a transistor is used, which switches the electrical circuit from the capacitor, inductance and active resistance, and when the current in the inductor winding reaches zero, the circuit opens. The calculation of the transient process in an electric circuit with a dynamically changing inductance is performed by solving a circuit-field problem with given initial conditions. The calculation of the electromagnetic field is performed by the finite element method for a two-dimensional model of the inductor. The study of electromagnetic processes in the inductor and thin-sheet non-magnetic workpieces with the amplitude of the maximum current density of 1 kA/mm^2 . The distribution of current density and magnetic force density on the workpiece surface and in time is given. It is proved that only for a small thickness of welded products (2 mm) can be achieved simultaneous power and current.

References 9, figures 4.

Key words: magnetic pulse processing, pulse inductor, transients, U-shaped core.

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