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EFFICIENCY OF UNIVERSAL ELECTROMAGNETIC STIRRERS OF LIQUID METAL DEPENDING ON FREQUENCY OF POWER SUPPLY

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Abstract

Results of numerical modelling of electromagnetic and hydrodynamic processes in electromagnetic systems of stirring of liquid metal with universal inductors, that depending on single or multiphase power supply creates in furnace bath dual circuit or single circuit vortex flows of liquid metal respectively have been shown. Changing during time such modes of power supply allow to stir liquid metal more efficiently due to alternating changing of structure of vortex flow. Two and three core universal inductors with different power supply frequency were investigated. Effectiveness of stirring was estimated with the help of average velocity of liquid metal in the volume of furnace bath. It was shown that in the mode of multiphase (two and three phase) power supply, at which travelling magnetic field is created, maximal effectiveness of

stirring reached at low frequencies (2-3 Hz), while in single phase mode, when only pulsed field is created, – at higher frequencies (20-50 Hz). It was found that during single phase power supply of three core inductor decreasing of frequency of current results in reverse of main flow of liquid metal, what not happens in the case of two core inductor. Recommendations on selection of optimal (rational) power supply frequency of universal stirrers are shown. References 9, figures 7.

Key words: electromagnetic stirring, liquid metal, universal inductor, single phase and multiphase power supply, pulsed and travelling magnetic fields, single circuit and dual circuit vortex flows, numerical modelling.

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