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ELECTROMAGNETIC PROCESSES IN PULSED ELECTRODYNAMIC EMITTER TO EXCITE ELASTIC VIBRATIONS IN CONCRETE STRUCTURES

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Abstract

The finite element analysis of electromagnetic processes in the pulsed electrodynamic emitter intended to excite elastic vibrations in concrete structures is carried out for two design variants including the emitter without laminated magnetic core and with the magnetic core having multi-turn inductor in its slot. For these cases, the field-circuit model is considered. The model takes into account the dependence of the discharge current of capacitor on the magnetic field diffusion in a conductive plate. It is shown that the electromagnetic force acting on this plate during the first half-wave of the discharge current varies in time as a bell-shaped function. That is important for concrete structures diagnostics. The availability of a magnetic core with the

same parameters of the discharge circuit, the dimensions of the inductor and the plate leads to the increase in the duration and amplitude of power pulse by about 30%. Moreover, when using a magnetic core, the redistribution of electromagnetic forces occurs so that the inductor conductors are unloaded from the forces action, and the magnetic core is subject to a significant force. References 8, figures 5.

Key words: pulsed electrodynamic emitter, discharge current, electromagnetic force, wave mechanical processes, diagnostics, concrete structures.

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