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Influence of the Flyer Kinetics on Magnetic Pulse Welding of Tubes

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Abstract

In this paper, the influence of different pulse generators with their characteristic discharge frequencies on the process parameters of magnetic pulse welding (MPW) of aluminum EN AW-6060 tubes on steel C45 cylinders is analyzed. Experimental, numerical, and analytical investigations focus on the radial impact velocity $v_{\mathrm{i,r}}$, the time dependent collision angle $\beta(t)$ and the impact pressure p_{i}. The influence of the temporal course of the magnetic pressure $p_m(t)$ is discussed. It is shown that the minimum radial impact velocity required for welding with the same geometrical setup can be reduced significantly at low discharge frequencies compared to high ones. This is attributed to a different deformation behavior of the tubular flyer part and