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Numerical Simulation of Metal Removal in Laser Drilling using Symmetric Smoothed Particle Hydrodynamics

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Abstract

A simple numerical model is proposed for predicting the penetration depth of metal laser drilling. A simplified 2D axisymmetric model for transient metal laser drilling is introduced. Strong-form of symmetric smoothed particle hydrodynamics (SSPH) method is used to harness its significant reduction in computational time. The 2D axisymmetric domain is discretized, then SSPH formulation is used to obtain shape functions. Collocation method is used to discretize governing and boundary conditions equations to construct the global stiffness matrix. Laser beam is assumed to be continuous wave with Gaussian distribution. MATLAB code is constructed for numerical simulation, and the results are compared with published work. A good agreement is shown, and thus the proposed numerical model is found to be computation-

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