

Analysis of Space-time Free-surface Velocity Profiles for the Samples of 12Cr18Ni10Ti Steel and M1 Copper

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The problem of obtaining more informative and accurate results is of current interest when conducting experiments on studying materials under shock loading. Multi-channel techniques are used for continuous recording of shock front and rarefaction wave parameters. Previously, the optical lever technique was used for this purpose which involved recording the flow parameters from the surface of a wedge sample using high-speed streak camera. The free-surface velocity sweep profiles recorded in such experiments allowed determining $S(t)$ profiles of shock-loaded materials. The present work describes the revised experiment with PDV technique for 12Cr18Ni10Ti steel and M1 copper stepped samples. The revised experiment and the subsequent analysis allowed improving time resolution for free-surface velocity profiles as compared to the optical lever technique. The experimental results were used to obtain the material strength properties and the parameters of shock and rarefaction waves.