ФИЗИКА КОНДЕНСИРОВАННЫХ СРЕД

THEORETICAL INVESTIGATION OF ELECTRON DYNAMICS IN LIQUID MEDIA UNDER NANOSECOND PULSED LASER IRRADIATION

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In this study, we develop a comprehensive mathematical model to explore the dynamics of laser-induced breakdown in water-like media, focusing on the electron multiplication process across a spectrum of laser intensities and wavelengths, ranging from 355 *nm to* 1064 *nm. Utilizing the Green's function method, we derived an analytical solution for the primary differential equation governing the temporal evolution of free-electron density. This methodological approach allows for an accurate characterization of the electron multiplication thresholds and precise timing of electrical breakdown under varied laser settings. Our findings demonstrate a robust correlation with data from experimental studies on laser interactions with water-like substances, confirming the model's predictive accuracy and its utility in enhancing our understanding of the mechanisms governing laser-induced electron dynamics. This research provides valuable insights for optimizing laser applications in similar environments, enhancing both theoretical understanding and practical application of the observed phenomena.*

Keywords: liquid media, free-electron density, analytical solution.

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