Turbulence Generation in High-power Laser-Plasma Interaction Relevant to Astrophysical Scenarios

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Many astrophysical scenarios such as supernova remnant (SNR), Cassiopeia A, the collision of galaxies, and turbulent magnetic field amplification in the intergalactic medium, etc has been imitated by utilizing high-power lasers. A hundred times stronger magnetic field has been observed in Cassiopeia A than the adjacent interstellar medium. It is presumed that the surrounding clumpy media near supernova remnant Cassiopeia A support myriads modes, which acts as a source for amplifying the turbulent magnetic field. The origin of magnetic field amplification in the clumpy medium is not fully understood yet. The typical model for this amplification is the seed field amplification due to turbulence generation. Such magnetic field amplification and turbulence generation have been reported experimentally in various laboratory astrophysics. A model is proposed to study the turbulence generation and magnetic field amplification, which ensues due to the high-power laser interaction with plasma. In this study we employed the computational techniques to solve the coupled system of the model equations.

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