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Plasma modulation in a high-intensity acoustic standing wave field BOCONG ZHENG, THOMAS SCHUELKE, Fraunhofer USA, QI HUA FAN, Michigan State University — Modulating the spatiotemporal distributions of plasmas is scientifically interesting and practically attractive to promote the plasma-materials interactions. However, the long range electromagnetic forces generated by the motions of charged particles in a plasma restrict its response to the external influences. Subsequently the distributions of the excited species are little affected due to their short lifetimes outside the discharge region. This work presents a concept of using acoustic standing waves to modulate plasmas. The simulation results predict a strong coupling between acoustic waves and plasmas. The plasmas oscillate with the acoustic standing waves over a significant scale, which is difficult to achieve by other reported methods. The maximum/minimum ratio of the excited species fluxes reaches 200%. This study initiates the effort to understand the mechanisms and characteristics of plasma discharges in a high-intensity acoustic standing wave field. Using acoustic waves to modulate plasmas has the potential to create many new applications and promote plasma-materials interactions.

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