Abstract

This computational work is motivated for better understanding of shock involved chemical process within a miniature supersonic flame. First, the inviscid Zeldovich-von Neumann-Doring (ZND) detonation wave structure is resolved for the CH4/Air gas mixture. Secondly, the structure of planar Argon shock wave is resolved by solving one dimensional Navier-Stokes (NS) equations. Thirdly, one-dimensional, steady detonation wave structure with full transport effects, viscosity, heat conduction and mass diffusion are studied. Different chemistry mechanisms are considered and both shock layer and reaction zone are resolved. It shows that the wave structure for CH4/Air detonation with and without transport effects are almost the same. Finally, the computational method developed for detonation wave calculation is applied to study the chemical reactions in the supersonic flame which involves shock wave, expansion fans, transport effects and chemistry.