Analysis on SiO$_2$ Particle Formation in H$_2$−CH$_4$ Mixed Fuel Combustion

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In this study, we use the commercial CFD−code FLUENT to analyze numerically the H2−CH4 combustion and SiO2 particle formation in the premixed flame reactor. The three−coaxial burner was used: H2/CH4 mixed with air and SiCl4 flows through the central tube of the burner, auxiliary H2 through the middle annulus and quenching air through the outer annulus. The computational domain is confined by a coaxial pyrex tube surrounding the flame. The conservation equations for mass, momentum, and energy in the simulation domain were solved by using the FLUENT to calculate the temperature, the velocity, and the species composition inside the premixed flame reactor. We calculated the profiles of fluid flow and temperature for various process conditions. Gas flow was considered in both burner tube and reactor tube. The effects of various gas velocities in the central inlet and H2/CH4 concentration ratios were analyzed systematically.