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Effect of reactions in small eddies on biomass gasification with eddy dissipation concept - sub-grid  
scale reaction model

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**Abstract:** Large-eddy simulation (LES) approach is used for gas turbulence, and eddy dissipation concept (EDC) - sub-grid scale (SGS) reaction model is employed for reactions in small eddies. The simulated gas molar fractions are in better agreement with experimental data with EDC-SGS reaction model. The effect of reactions in small eddies on biomass gasification is emphatically analyzed with EDC-SGS reaction model. The distributions of the SGS reaction rates which represent the reactions in small eddies with particles concentration and temperature are analyzed. The distributions of SGS reaction rates have the similar trend with those of total reactions rates and the values account for about 15% of the total reactions rates. The heterogeneous reaction rates with EDC-SGS reaction model are also improved during the biomass gasification process in bubbling fluidized bed.

**Keywords:** EDC-SGS reaction model; SGS reaction rates; large-eddy simulation; biomass gasification; bubbling fluidized bed

## 1. Introduction

Recently, it becomes urgent to develop renewable energy resources for energy crisis and environmental pollutants from fossil fuels. Biomass, as a kind of renewable energy resources, has gradually substituted fossil energy owing to its advantages of rich resource and friendly

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