**Simulating Soot-Formation in Oxy Coal Combustion using Large-Eddy Simulation**

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This paper focuses on soot formation in oxy-combustion of coal and challenges associated with it. When coal pyrolyzes light gases are given off along with a heavier tar. In traditional coal combustion systems this tar transformation serves as the main source of soot; but in oxy-fuel systems, significant soot may result from light gas reactions as well. We present a soot formation model that includes soot transformed from tar and grown from nucleated light gases along with growth mechanisms for these particles. In addition to the formation of tar and soot, a model of tar and soot secondary pyrolysis is included. Tar and soot are consumed through a combination of gasification and oxidation. Oxidation and gasification rates from literature will be explored. LES of a lab-scale oxy-coal combustor are presented with models for secondary pyrolysis and soot formation; along with comparisons to experimentally gathered data. Effects of soot on radiation, gas temperature, and heat loss are also explored.