Optimization of Coal Particle Flow Patterns in Low NOx Burners

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Our research in this project is directed at evaluating the effect of flame aerodynamics on NOx emissions from coal fired burners in a systematic manner and developing rational design tools for optimizing low NOx burners. This fundamental research includes both modeling using a two-fluid framework and experimentation in both hot and cold flows evaluating the effect of flame holder geometry, primary and secondary inlet velocities, coal concentration and particle size distribution. Detailed, non-invasive flow measurements will be obtained using a laser Doppler velocimeter with phase Doppler capability. In this beginning stage of our project we have designed and begun construction of both the hot and cold flow furnaces. We have also decided on our "base" operating conditions and system parameters. Finally, we have used Fluent to predict the flow patterns and the extent of flow recirculation in our proposed burner designs.