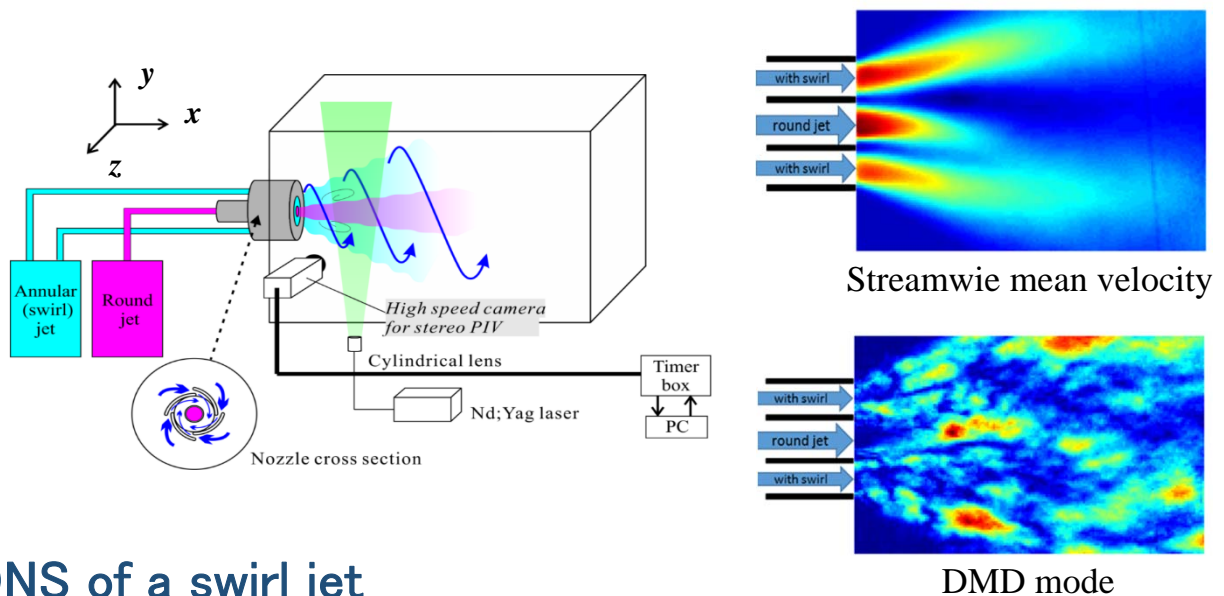


Mixing and diffusion in coaxial swirl jets

Abstract

In pulverized coal combustion, fuel (coal particles) is provided into the combustion chamber by a round jet while the air is provided by a swirl jet. The interaction of these flows primarily contributes to mixing of fuel and the air and mitigation of toxic gases. However, these flows are optimized empirically due to the complexity of the phenomena. In this study, we investigate the flow structure and mixing by both experiments and simulations to achieve logical control of the flows.

PIV measurement of a swirl jet



DNS of a swirl jet

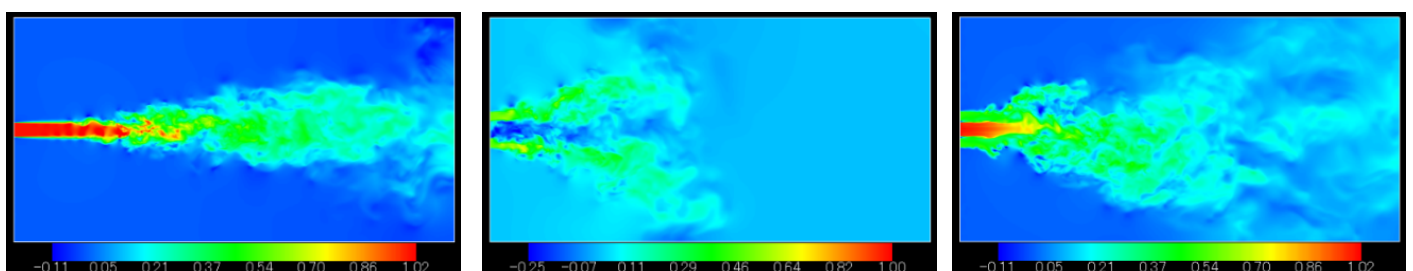


Round jet

Swirl

Round jet with swirl

Vortical structure



Round jet

Swirl

Round jet with swirl

Streamwise mean velocity