

# Combustion Characteristics of Conical Flameholder on Lean Premixed Combustion

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Lean premixed combustion is one of the most effective methods to reduce NO<sub>x</sub> emissions. Premixed type combustor for gas turbine generally uses swirl type flameholder. They have a problem that the range of equivalence ratio for stable and high-efficiency combustion is very narrow as compared to diffusion combustion. Aiming at realizing stable premixed combustion in wide

equivalence ratio range, a new type flameholder shown in Figure 1 was designed. The flameholder has conical shape and some ideas to extend the lean limit and control the combustion oscillation are incorporated. It has a premixed pilot burner at its vertex and slits on its side. Burned gas, which is generated by the pilot burner, is induced to radial direction by the side of the cone. Main mixture flows into the flameholder through the slits and is ignited by the burned gas. Combustion characteristics of the flameholder were evaluated by gas analysis and pressure measurement. For comparison, conventional swirl type flameholder is also tested. From the result of measurements, following conclusions are obtained.

1. The conical flameholder offers high combustion efficiency in shorter distance than the swirl type one in the lean conditions.
2. The combustion oscillation level caused by the conical flameholder is lower than the swirl type one in the same condition.
3. By using the conical flameholder, the combustion efficiency and combustion oscillation can be controlled by flow rate of the pilot fuel.

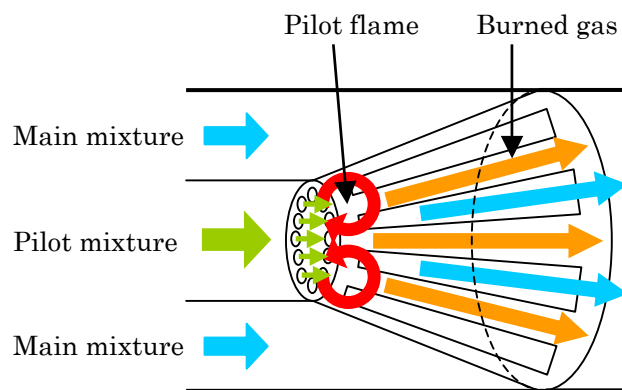


Fig. 1 Concept of conical flameholder