Two Stage Ammonia Combustion in a Gas Turbine like Combustor for Simultaneous NO and Unburnt Ammonia Reductions

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Background and objective

- We have studied the use of ammonia as for the use in gas turbine facility.

Numerical simulation

- 3D LES simulation with Miller’s mechanism.
- Two stage combustion concept was proposed for the first time.


Collaboration with AIST

Objective: confirm experimentally the two stage combustion concept using the model swirl burner.

Conclusions

• Reaction quenching of primary zone by secondary air injection may cause significant increase in unburnt NH$_3$ emission.

• Experimentally confirmed that potential of secondary air injection. The amount of NO can be reduced lower than the Japanese emission regulation (70 ppmv@16%O$_2$).

• The overall emission characteristics is drastically changed with the primary zone equivalence ratio, but overall equivalence ratio is less sensitive to the emission characteristics.

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