NASA SBIR/STTR Technologies

Artificial Neural Net Chemistry Module for Large Eddy Simulations

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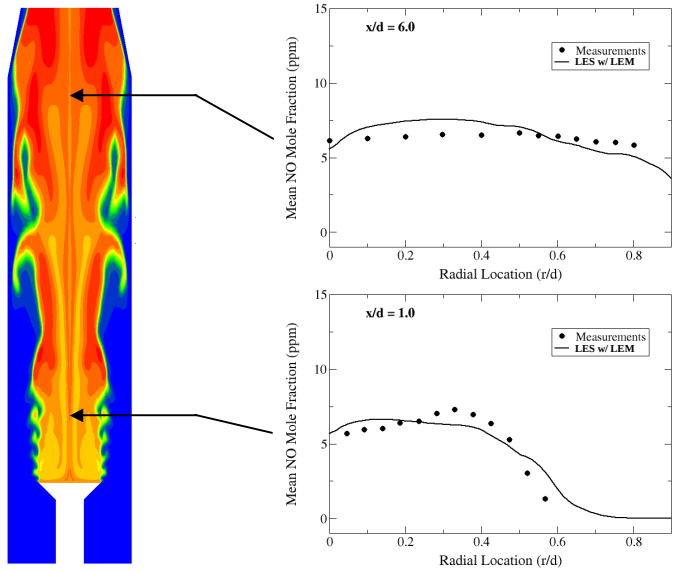
Proposal No.: A2.01-8024

Description and Objectives

- Jet-A Subgrid Chemistry Module for Combustion LES Codes
- Based on Linear Eddy Mixing (LEM) Model
- Captures Turbulence-Chemistry Interactions Down to Kolmogorov Scale
- 100x Speed-Up Using Artificial Neural Net, Making Combustion LES Calculations Practical for Combustor Design

Premixed Methane-Air Bluff Body Combustor



Approach

Efficient combustion LES is achieved with an Artificial Neural Net that is trained with off-line Linear Eddy Mixing (LEM) model data. Predicted NO_x emissions with the LES/LEM are shown in the figure.

Subcontractors/Partners

Prof. Suresh Menon, Georgia Tech

Schedule and Deliverables

TASK DESCRIPTION	Months After Receipt of Contract					
	1	2	3	4	5	6
Task 1. Develop Stand-Alone (Off-Line) LEM Code						
Task 2. Generate Training Data						
Task 3. Train the ANN						
Task 4. Development and Implementation of Jet-A Chemistry Module						
Task 5. Evaluation of Jet-A Chemistry Module						
Task 6. Phase II Planning and Final Report						

○ Bi-monthly Report □ Final Report

NASA & Commercial Applications

Combustor design tool to help meet NASA UEET emission goals; high interest to gas turbine engine manufacturers.