ASCENT Project: 071

Predictive Simulations of nvPM Aircraft Emissions

Georgia Institute of Technology

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Cost Share Partners: [1]Georgia Institute of Technology, [2]University of Michigan, and [3]Raytheon Technology Research Center.

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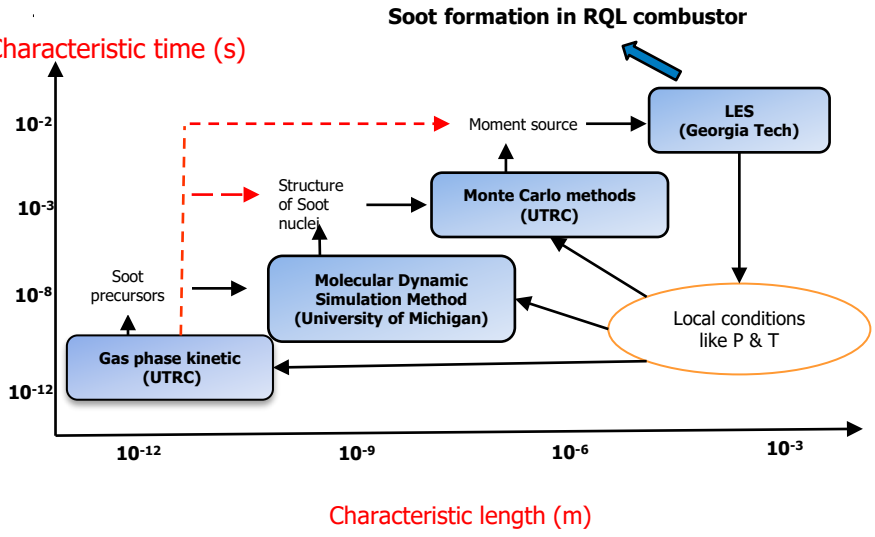
Objective:

- Reliable soot kinetics for jet-fuel systems
- Develop a new model for nanoparticle inception
- Link kinetics and particle inception to growth models
- Improve Method of Moments (MOM) within large-eddy simulations (LES)

Project Benefits:

- Predictive jet-fuel kinetics model for aeroengine combustor emission
- New predictive inception and growth models for soot formation in PAHs dominated fuels
- New CFD to simulate emission from turbulent flames based on analysis of these tools



Major Accomplishments:

- Reduced kinetic mechanism for jet fuels with Pyrene
- Free energy calculations of PAH dimer stability at RQL combustor operating conditions
- One way coupled soot growth model based on Monte Carlo approach at realistic combustor conditions
- LES of reacting flows in a practical combustor (ASCENT P70)

Future Work / Schedule (3-Year Plan):

- Complete assessment of PAH based soot kinetics
- Couple particle growth model with nucleation and inception-growth model for use in LES
- Reduced soot models within MOMIC for LES application in canonical applications

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