

## PECOS/NASA JSC ablation discussion

### NASA/PECOS Interaction:

- Introduce the MEDLI project that Adam and I will be working on
  - Primary goal – FIN-S/Chaleur loose coupling
  - Ancillary goal – proceed in this toward the development of a multidimensional transient ablation model
- Identify overlap with PECOS goals and look for areas of collaboration
  - Comments?

### Algorithmic Issues:

- Coupling strategy – loose vs. tight: Implement existing Rochan ablator BC in FINS and run in both coupled and decoupled modes ... May need to run only coupled mode and compare with Paul's version. If coupled version runs then we can delay a decoupled version. *Expectation is that coupled approach will have superior convergence properties, but disparate time scales might pose a challenge.*
  - Proposed POCs: Kirk, Stogner, Bauman
- FIN-S/Chaleur coupling: Use comparisons between Rochan's Quasi-Steady model and the Chaleur 1D transient model – assess QS model assumptions (same front rates etc...) and range of applicability/accuracy of this model. "Model as simple as possible but not too simple"
  - Proposed POCs: Kirk, Amar, Bauman,...
- Higher-dimensional (2D/3D model), probably using FEM on top of libMesh. *For NASA's Purposes*, we will likely want to be able to run this both stand-alone and fully coupled.
  - Contact John Dec NASA/LaRC and query the status of his 3D ablation libMesh-based dissertation code.
  - Proposed POCs: Amar, Rochan, Stogner, Kirk (?)

### Near-term Efforts:

- Incorporation of quasi-steady ablation model BC into FIN-S (single-domain physics)
- FIN-S work on standard and conjugate heat transfer problem with libMesh to exercise and verify 2-domain coupled model. Perform associated verification tests, application to wind tunnel conditions, etc...
- Begin modeling document for higher-dimensional ablation model
  - Identify requisite thermochemistry and transport processes and suitable software packages (CANTERA?)
  - Proposed POCs: Amar, Rochan

### Logistics:

- Adam needs to get access to a meaningful subset of the PECOS svn repo (today?)
- The FIN-S/Chaleur coupling will be loose. Also, this will be an ITAR headache. Does PECOS have a Chaleur usage agreement in place? Will likely need a restricted access branch for this work.
  - Proposed POCs: Simmons, Schulz
- Possibility on the NASA side of bringing Dec on board later on, depending on the progress he has made in his independent efforts.