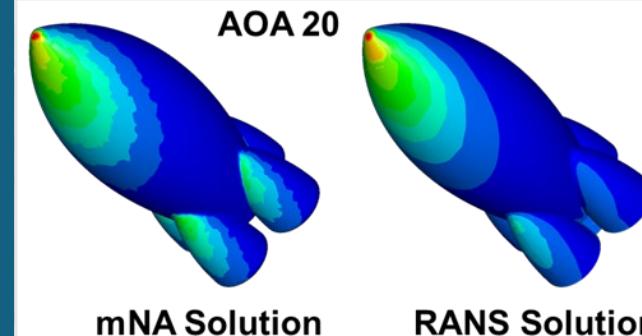
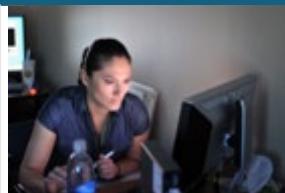
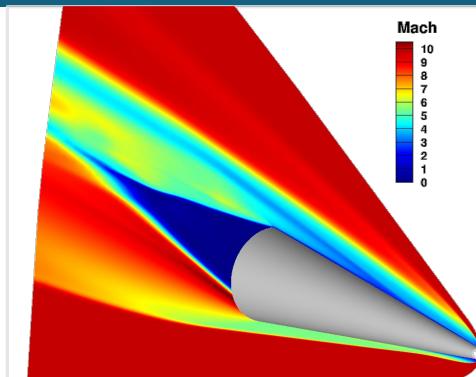




Sandia
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SAND2020-11604PE

Multi-Fidelity Toolkit (MFTK) Credibility Project Plan

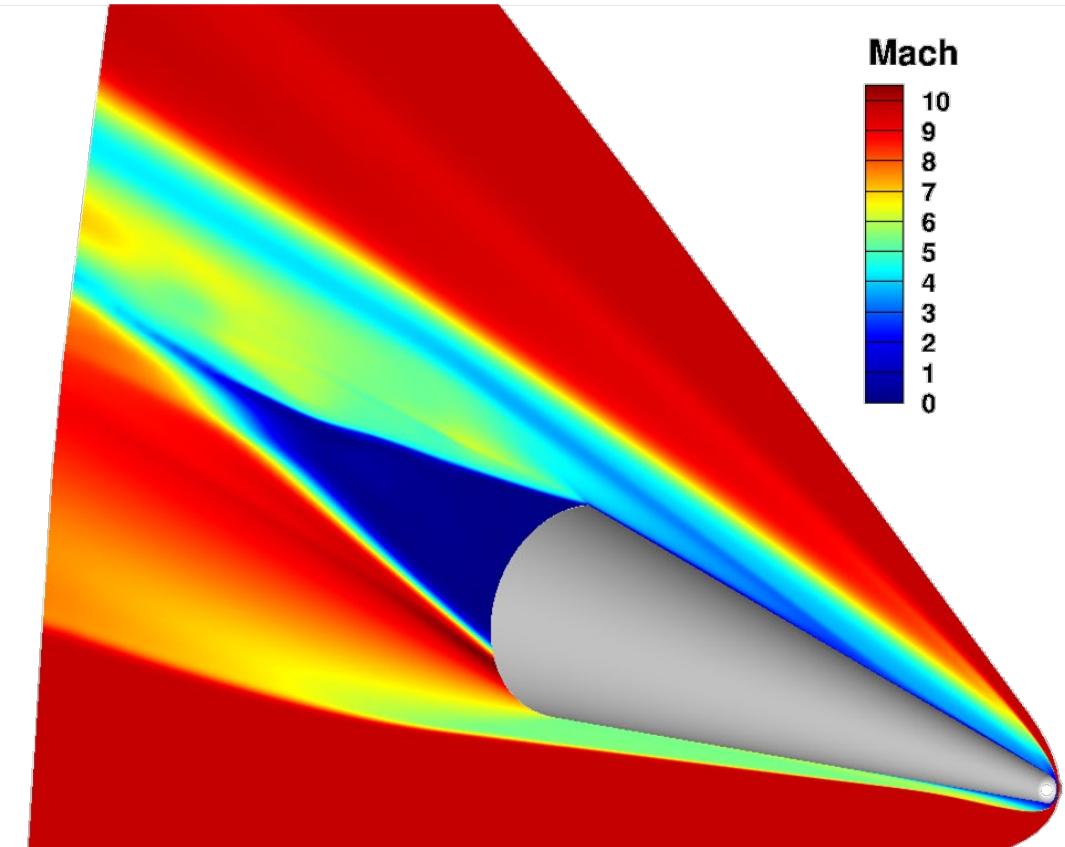


Blake Lance, 2020-11-06

Project Purpose



- Purpose: Add value to the Sandia Labs Hypersonics mission by applying credibility processes to the Multi-Fidelity Toolkit (MFTK) and its applications through verification, validation, and uncertainty quantification
- Why: MFTK enables faster execution of hypersonic aerothermal simulations by speeding up the most expensive step



“Hypersonic Research at Sandia National Labs”, Aerosciences
Org 1515

Team Members and Funding

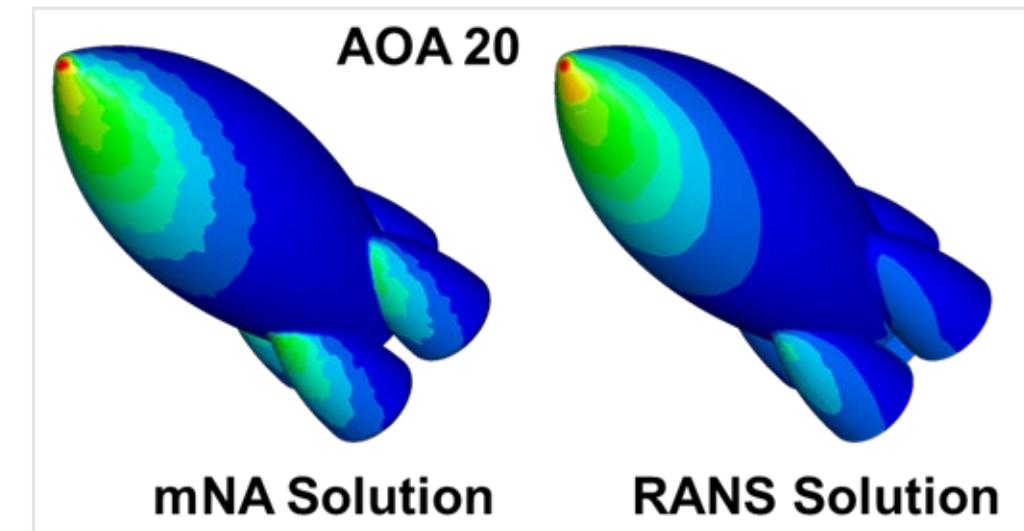


Team

- Brian
 - Verification SME and mentor to Aaron
- Aaron
 - Graduate Student Intern
 - Verification Practitioner
 - Likely to convert to PostDoc in December/January
- Blake (PI)
 - Validation and UQ Practitioner
- Ross
 - MFTK Development PI

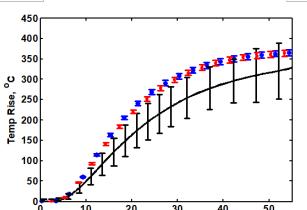
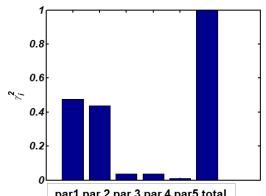
Funding

- Source is DOE-NNSA-ASC-V&V-R&D
- Amount is \$100k for FY21
- Potential for follow-on work

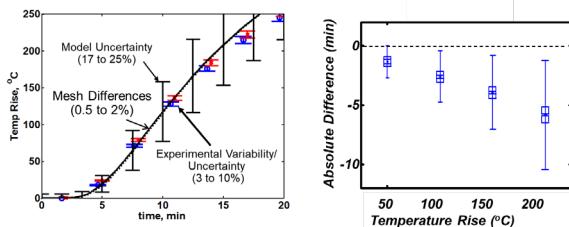


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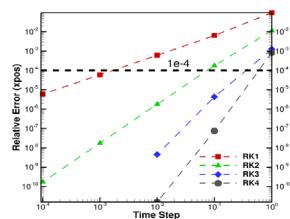
Computational Simulation Credibility Elements



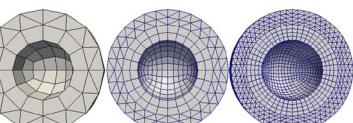
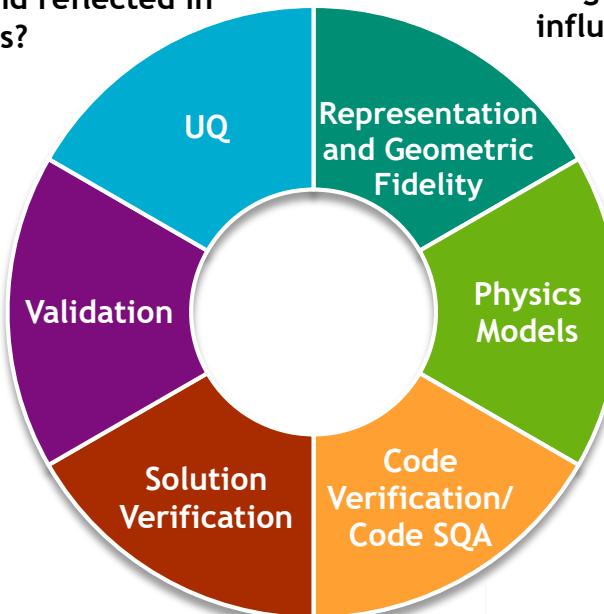
How are uncertainties assessed and reflected in simulation predictions?



What is the discrepancy between simulation and experiments?



How do numerical solution or human errors affect simulation results?

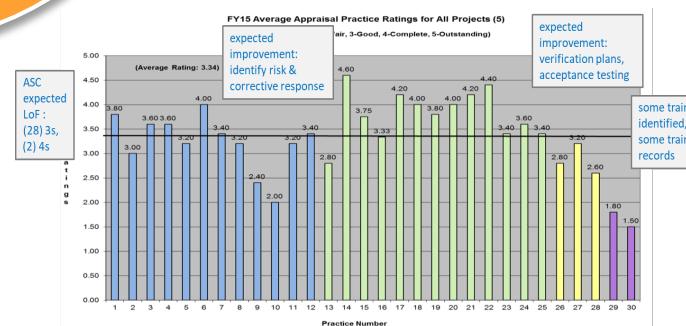


As-Modeled As-Designed

How are geometric feature simplifications influencing simulation results?

Phenomena	Importance	Adequacy for Intended Use		
		Math Model	Code	Validation
Phenomena 1	H	H	M	L
Phenomena 2	M	H	M	L
Phenomena 3	L	H	M	L

Are important physics models adequate?
Key gaps mitigated?



What is the evidence for code credibility?

Plan and Budget



Q1

- Develop detailed project plan
- Setup teaming structures (regular meetings, Collaborative, Confluence, budget tracking)
- Complete Geometric Fidelity and Physics Model evaluations

Q2

- Develop verification and validation (V&V) methods

Q3

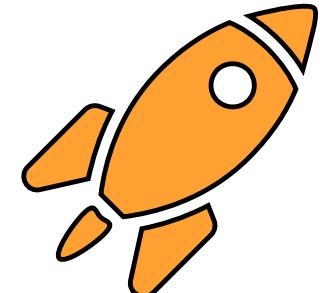
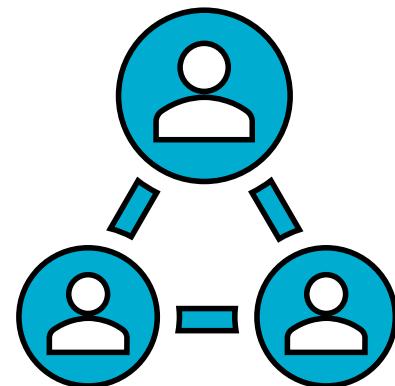
- Implement V&V methods

Q4

- Document in final report

Budget

- 50% for verification
 - Aaron will do most of the detailed work at a lower rate (intern/PostDoc)
 - Brian will mentor
- 40% for validation and UQ
- 10% for project management



Deliverables and Milestones



○ Quarterly reports

- 1-2 pages
- High-level
- Budget tracking
- Achievements
- Challenges

○ News Note

- Optional update for notable accomplishments written for DOE program leadership

○ Final report

FY20 Quarterly Reporting Input for PEM/VV
VERSION 2017-11-20
The following input is needed for quarterly ASC Program reporting.

PI name: Blake Lance
Program Element (PEM or VV): VV
Project Name: Experimental Credibility
Project/Task No.: 103723/06.20.07

Costs

1. Cost as of 2020-09-04, 66k\$ of 75k\$
2. End-of-Year Status
 - Estimating project will be close to spent to finish writing "What Is" guide

Deliverable Accomplishments

Remember:

- ✓ Must map each bulleted line item (performance to plan) to a target(s). The targets are listed at the bottom of this section.

1. [SNL-V&V-1&2] What is the project deliverable?
 - Completion of background report, "What is" guide, revised framework, outreach
2. [SNL-V&V-1&2] Performance to Plan (=Meets)
 - Performed outreach and feedback meetings through Dowding connection
 - Completed EC application meeting with JTAC
 - Completed multiple discussions on renaming and out naming survey to larger group that could be used
 - Started "What Is" guide, expected to finish in Q4
3. [SNL-V&V-1&2] Exceeds
 - NA
4. [SNL-V&V-1&2] Area of Technical Concern or Challenge
 - NA

Risks

Remember:

- ✓ Risks do not need to change each quarter.
- ✓ Risk = A potential event that could keep you from meeting your targets.

1. Identify at least one risk, but could have more.
 - Background report completion by Kieweg is on scope, but there is a risk that it will not be completed by the end of the quarter.

Issues, Challenges, Lessons Learned, Continual Improvement

Remember:

- ✓ Issue = A risk that has been realized.

1. NA

News Note
(submit separately using either UUR or OUO template)

L2 Milestone

SANDIA REPORT
SAND20XX-XXXX
Printed Click to enter a date

SAND Report Title

First name, middle initial, and last name of author(s).



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