

Task 2.1 Test Down-Selection

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WORKING GROUP MEETING FALL 2016
CAMBRIDGE, MA

Outline

- Task 2.1 Progress
- SolidWorks Model
- Nek5000 Modeling Approach
- Future Work

Task 2.1 Description

Task #	Description	Owner
2.1	Sodium Loop	
2.1.1	Survey literature of existing sodium test data	B. Woods
2.1.2	Select two candidate problems	B. Woods
2.1.3	Organize and document data for two candidate problems	B. Woods
2.1.4	Identify and review industry needs for sodium loop data	B. Woods
2.1.5	Down-select to one problem for benchmark evaluation	B. Woods
2.1.6	Preliminary modeling with industry tool Star CCM+	K. Weaver
2.1.7	Preliminary modeling with NEAMS code Nek5000	D. Pointer
2.1.8	Comparison of experimental data & model results for problem	B. Woods
2.1.9	Benchmark level evaluation of problem	B. Woods
2.1.10	Evaluation of uncertainties in selected problem	B. Woods
2.1.11	Submission of benchmark for peer review	B. Woods

Task 2.1 Schedule

Task ID [#]	Year 1				Year 2				Year 3			
	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4	Qtr 1	Qtr 2	Qtr 3	Qtr 4
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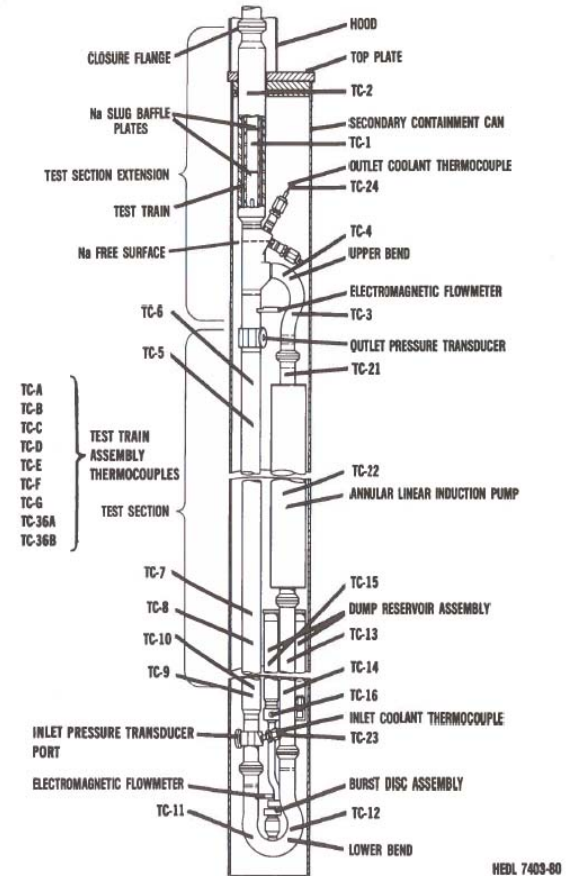
Two Candidate Problems Selected

Down-selected to a Single Problem

Preliminary Modeling in CFD Codes

Problem Specification Report – HOP 1-6A

- Report Nearing Completion
 - Final Touches on Facility Description
- Discussion of Data Transmittal
 - Thermocouple Locations Not Detailed for CFD Benchmarking
 - Lower Electromagnetic Flowmeter Data Very Noisy
 - Permanent Magnetic Flowmeter Data was Lower Than Expected
 - Flowmeter Reliability is Questionable for Low Flow Rates



Problem Specification Report – HOP 1-6A

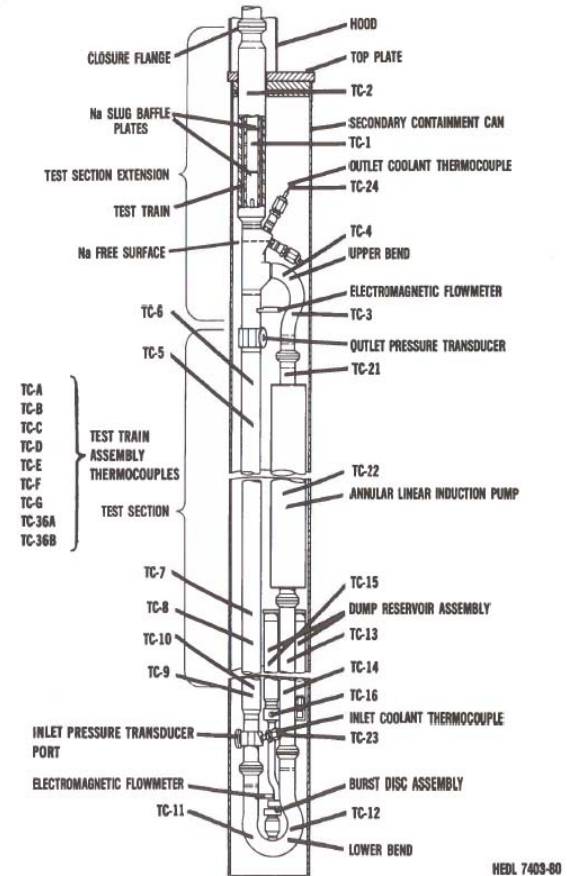
TEST TRAIN ASSEMBLY AND LOOP BODY THERMOCOUPLE LOCATIONS FOR THE HOP 1-6A TEST

<u>Thermocouple Number</u>	<u>Flow Tube Position (See Figure 3.3)</u>	<u>Vertical Distance Above Bottom of Fuel Column</u>	<u>Loop Body Position</u>
1, 2	---	---	Closure Tube
3, 4	---	---	Upper Bend
5, 6	---	---	Upper Test Section
7, 8	---	---	Middle Test Section
9, 10	---	---	Lower Test Section
11, 12	---	---	Lower Bend
13, 14	---	---	Pump Tube Extension
15, 16	---	---	Dump Tanks
TC-A	"A"	25.72 cm	Test Train Assembly
TC-B	"B"	25.72 cm	Test Train Assembly
TC-C	"B"	17.145 cm (Fuel Column ϕ)	Test Train Assembly
TC-D	"C"	17.145 cm (Fuel Column ϕ)	Test Train Assembly
21	---	---	ALIP Flange
22	---	---	ALIP Case
23	---	---	Sodium Inlet
24	---	---	Sodium Outlet
TC-E	"A"	17.145 cm (Fuel Column ϕ)	Test Train Assembly
TC-F	"B"	8.573 cm	Test Train Assembly
TC-G	"C"	0 cm	Test Train Assembly
TC-36A	Bulk Sodium Coolant Outlet		Test Train Assembly
TC-36B	Bulk Sodium Coolant Outlet		Test Train Assembly

Problem Specification Report – HOP 1-6A

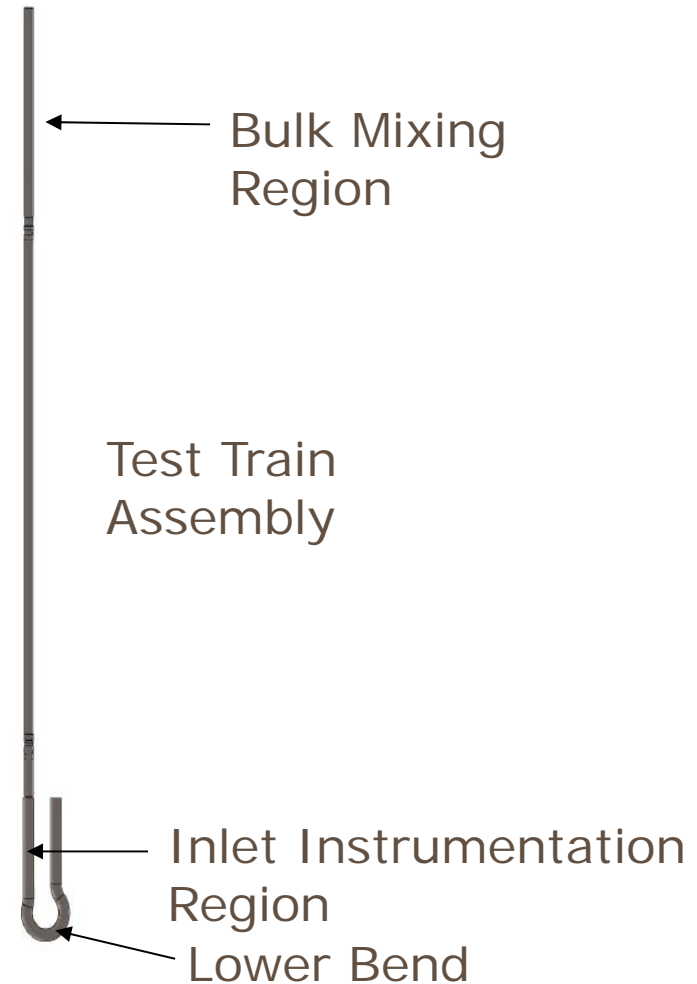
• Questions

- Is flowrate worth tracking if the data is questionable?
 - Possibly just compare the two CFD codes and ignore data
 - Test report suggests comparing to the TOPLE code results for flowrates
- Is the temperature location data detailed enough?
 - Hopefully will be able to locate some of the TC-s in the drawings for location specification



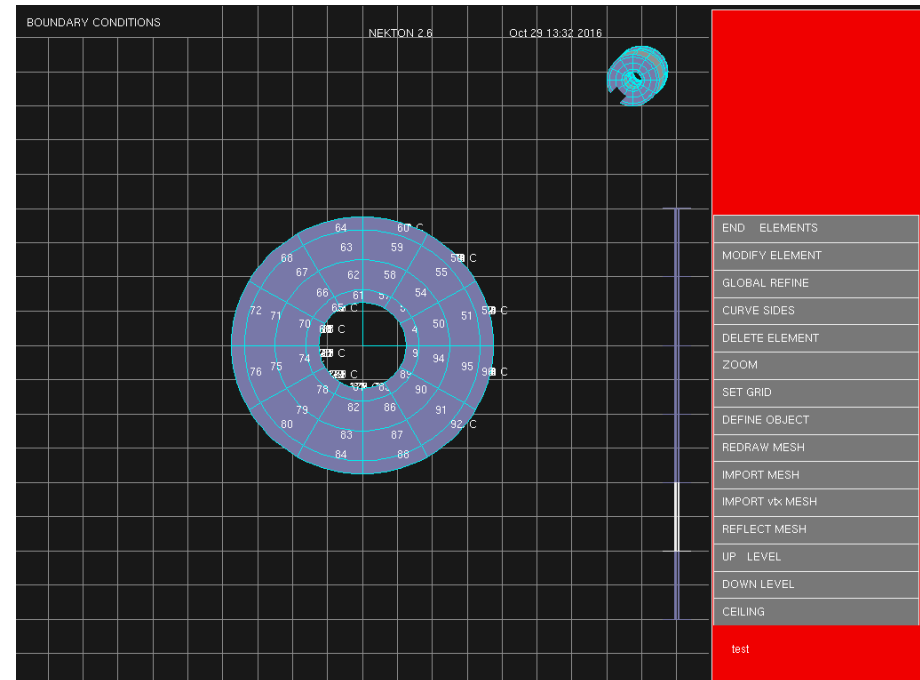
HOP 1-6A Solidworks Model – Bulk Mixing Region

- Questions
 - What simplifications, if any, should I put into model?
 - Is the proper amount of the loop being modeled?
 - What sort of drawings or parts are beneficial for deliverable and documentation?



Nek5000 Preliminary Modeling

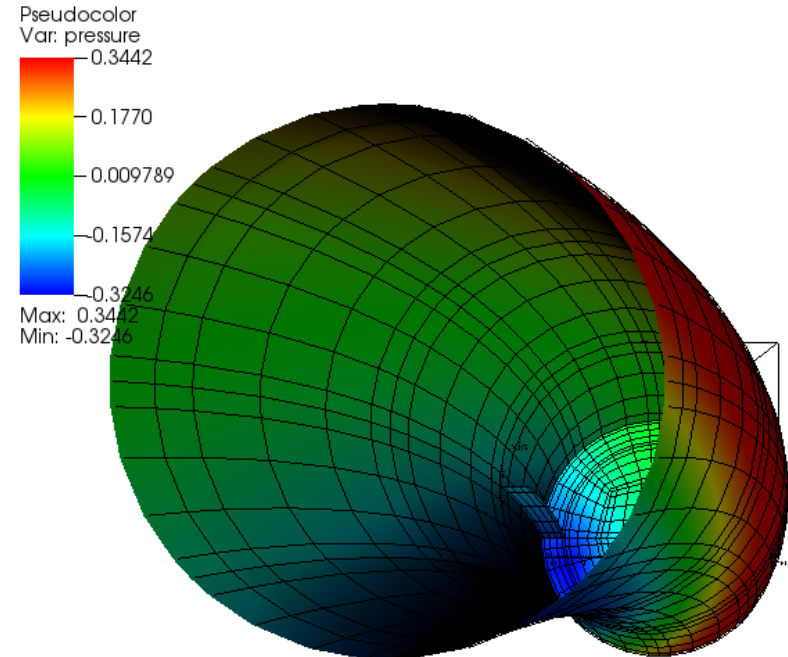
- Postx, Prex, and Visit all running
- Able to run several practice problems as well as open them in the pre- and post-processor
- Working on modifying example models to more closely resemble the HOP 1-6A Geometry
 - 3d-annulus model



Nek5000 Preliminary Modeling

- Questions

- Start with example model or start from scratch?
- Is there a method to convert my Solidworks model into a Nek5000 mesh?
- Best training tools for learning Nek5000?
- Begin with a single fuel pin and move on to more complex models?



Conclusions and Future Work

- Solidworks model very nearly complete
 - Released soon after final drawings available
- Problem Description Report will also be released soon
- Nek5000 Modeling has begun but more training is necessary