MOOSE project report grading:

Shehab

614 K centerline temp is too low. temperature drop over the fuel from analytical equation is LHR/4/pi/k, which yields ~400K temperature drop. Your scaling from LHR to Q was wrong, and I’m not sure how you got 0.318. Wouldve been good to show your work here. Wanted to see a comparison to analytical equations.

1-d transient didn’t converge. Points to simulation set up being improper. Is there a temperature drop over the gap in the transient or the 2-D cases? Seems like there isn’t. (Typo in fuel kth.) 2-D has same problem with the heat source being too low. Using the higher heat source allows systems to converge.

Axial profile is implemented correctly.

Good use of graphs to report results.

Verifying against an analytical result in the 1-D case would have solved a lot of your issues and shown that the heat source was wrong.

Any comment or discussion on the thermal expansion? Temperature-dependent thermal expansion?

You should have provided more context or analysis of the results, rather than just dumping the results as is.

Overall, pretty decent and you got a lot of the implementation correct.

+5 for turning it in on time

Grade: 85+5 = 90

Mahmoud

Well written intro and background. Good description of problem setup.

Good analysis of the individual blocks. Well implemented heat source and material properties. Correct implementation of both transient and SS 1-D models.

Correct implementation in 2-D, but we should still have linear temperature drop across gap and cladding. I would have to read more closely to see why you didn’t see that. Max temp should not be at midpoint, but at ~60% up fuel column.

Didn’t get the kth(T). But reasonable approach to thermal expansion.

Grade: 90

Jess

Good setup overall, but your mesh is SUPER dense. This is going to take a long time to run. But your design of different meshing for each system is a good one. You used the LHR value when your Heatsource uses a volumetric measure. You only have one BC, but you need two. The neumann BC at the “left” side, center of the fuel pin. Deriving the equations in class, we used both the fixed BC and the dT/dx=0 BC. You didn’t need the thermal contact, and it messed some things up. If you had plotted the temp vs R, you would have seen the super drop in the temp in the gap. You had things prescribed twice, so I am not even sure what MOOSE decided to do in your case.

Appropriate material properties. Well written report. Incomplete 2-D system. I wish you had come to me with questions, so we could have solved your issues with the 2-D. Please come and ask questions, even via email or slack. I feel like I have spoken to you the least of the students, but I was willing to help.

Incomplete part 3. You were making progress on it, but seemed to just run into road blocks that prevented completion.

Grade: 80

Rubyea