MOOSE Part 2 Grading

Anthony Cowan

Good intro. Good outlining of the methods. Good material definitions. Properly cited. Typo in your report for the LHR(z) function, but used the correct one in your file. Was the way I envisioned doing the BCs. Results from part 1 all look good. Temperature profiles all look reasonable. Centerline T is reasonable. Well written report. Code converges. Outputs match results. All looks good to me.

Grade: 99

CeCe

Very well written report. Properly defining materials and references. Would prefer you to type equations instead of copy/paste into the text as an image. BC defined in the expected way. All looks good. Data from previous parts looks good. Good context on the differences in this problem and a real reactor core size. Also have the higher power generation closer to Z0. Good context. Results all look reasonable. Code converges well. Could have used a conclusion to wrap up the report, felt like it ended in the middle of a section.

Grade: 99

Gwen

Writing tips, best not to use possessive phrasing, ‘my gap’. Hyphenate temperature-dependent. Justification for ny=100? Seems arbitrary. The fact that your results diverge with increasing mesh refinement seems odd. It should only converge and become more accurate. Were there code convergence problems? You didn’t include the LHR to VHR conversion in the report in eq 3, but it is included in the code. For eq4, you put the conversion inside the cosine, which is wrong. But again, its right in the code. For your BC, you had it set up properly, but used a fixed value of z, instead of letting it be a function of z. Thus, your BC is a constant value, instead of a function, as it should be. I made this edit and the code ran fine. Your constant k and variable k in fig 4 cant be right. There should be a larger difference here, with variable k(T) producing lower centerline temps. Because you enforced the constant value BC, your fuel centerline temp peaks at the center, when it should be shifted up in z/y. Your analysis of this result is a bit off, doesn’t quite make sense. Well written report, some issues, but basically got there except for fixing the z in your BC.

Grade: 93

Hongsup:

Should have included results from Part 1 as well in the writeup. Good theory writeup. Didn’t need to go through all of this development of the hc, but it is good to see. Could have used the values reported in class, which was 2.6 W/cm2-K. But yes, this is the thorough way to do it. Good definition and citing of kth in different materials. Your equation is different from the one developed in class for LHR(z). Where is this from? Gives the same profile, but with slightly different extrapolation lengths. Did some math wrong in your T\_inf equation compared to your input file. Not sure how much that will affect it. But should be 0.64, instead of 2.1322. Could you have done AD of the kth to skip the step of defining the derivatives? You can define it as an ADHeatConductionMaterial with a function. Should have seen a shift in z of the centerline temperature peak, but only slightly. I assume the math error causes this discrepancy. Other error is forgetting to scale your LHR to a VHR, which gives you much lower peak centerline temperatures. But everything looks good. Code runs, good convergence study. All look solid.

Grade: 96

Joy

Since you are using the adjustment to a theoretically dense UO2, your kth values are a bit higher, and thus your temperatures are a bit lower. This is fine, as you showed your work on this. Typically, using the 95% value is accepted, as this is the ballpark density of actual UO2 fuel. You saw in your convergence that using too many elements can lead to divergence, probably because of the elongated nature of the elements and the small gradients between them. Should have had the purple label in fig 5 be k(T), not just kth. Glad that you went back and fixed the first part. This all looks very good. I would recommend outputting your csv files more fine, such that you don’t get what appear to be discrepancies around your gap. I think that is just a plotting/csv artifact, but it makes the transition look off. Would have been good to show how you were handling the LHR(z) and the T\_cool for your system in the report. I had to look to your files to verify what you were doing. But your BC is handled appropriately. Peak should be shifted just north of 0.5 Z0, as you saw, but its because the coolant is getting hotter with Z, so your BC changes, shifting the peak centerline T. Good convergence behavior. Code runs. Everything looks good!

Grade: 96

Lexi:

Cole:

Vaughn

Good use of convective heat flux BC. Could have just set Function Dirichlet BC using the Tco-Tcool relationship in class combined with your Tcool. But this works too. Yours is probably more robust, as we presented an assumption in class.

Tim:

Anthony: PCT=1752K, z=50.58

CeCe: PCT=1754K, z=50.75

Gwen: PCT=1721K, z=49.95

Hongsup: PCT=1125K, z=49.9

Joy: PCT=1333K, z=51.01

Lexi: PCT=1766K, z=50.5

Tim: PCT= 1989K, z=1

Vaughn: PCT=1592K, z=52

Cole: PCT= didn’t report