Short group activity simulating a molten salt reactor with MCNP.

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Original idea by Cedric Eveleigh, adapted to MCNP by Simon Younan.

The MCNP version is MCNP4C, which does not require a licence to run.

The executable provided runs under windows on a PC. You may ignore pop-up messages informing you of obscure errors. They relate to the running of MCNP on Windows, not to the actual running of MCNP itself. MCNP writes its own output files.

The manuals of MCNP are provided as pdf files.

The exercise includes the following tasks:

1. Examine input file str01:
   a. Understand the geometry
   b. Determine the material composition, in particular the salt composition
   c. Establish the temperatures of the various components
   d. Understand control cards
2. Run mcnp:
   a. Open a CMD window on the PC.
   b. Navigate to the mncp directory.
   c. Type mcnp.exe inp=str01 out=str01,out xsdir=xsdir (xsdir is a file that points to the nuclear data, have a look at it) Note that you need to remove all output files if you want to run the same command again, mcnp does not overwrite files.
3. Examine the output file:
   a. Use the manual to understand some of the output;
   b. Understand why there are inactive and active cycles.
   c. Make a note of k-eff
   d. Look at the development of k-eff.
4. Examine the files str02, str03 and str04.
   a. Run each one of them
   b. Establish the relevance of the outcomes
   c. Draw conclusions and the neutronics of the STR.
5. Consider the files strf1-strf4, and repeat the exercise.
6. Independent study.

File STR01:

```
Salt Tub Reactor
10   1  -4.34   -10     12 -13   IMP:N=1 TMP=7.75559727e-08
11   2  -1.75   -11 10 12 -13   IMP:N=1 TMP=6.89386424e-08
12   0          #(-11     12 -13) IMP:N=0

10   rcc  0 0 -1  0 0 302     2.37
*11 rhp  0 0 -2  0 0 304  0 10.1 0
12   pz                  0
13   pz                300

mode n
totnu
kcode 20000 1.0 20 100
ksrc 0.0 0.0 150.0
m1       3007.60c  3.6113E-02
          9019.60c  5.7484E-02
         92235.60c  2.5E-05
         94239.60c  1.0E-05
         92238.60c  4.95E-03
m2        6000.60c  8.77414E-02
          5010.60c  9.64977E-09
          5011.60c  3.90864E-08
mt2  grph.05t
```