Nuclear Reactor Physics : Neutronics

Homework 6&7: The Neutron Slowing-Down

The number of stars gives the estimated difficulty of an exercise, though I must say they are not a very trustworthy notation system since I do not really know what you will find challenging or not.

You can either write your answer through :

- Google Docs document (insert > Equation... > type your question using LateX-like directives or select manually the formulas you want to introduce).
- Any word processor that supports equations (Word, LibreOffice,...)
- Good ol' paper and pencil, then scan your solutions.
- Virtually any other method you can think of, as long as I can read it

You can then send that to me by:

- Email at NuclearEngineer@ureddit.com
- Dropbox/Google docs link
- Use of the "send your answer" form (select the homework/quiz you are answering to, write your Ureddit username, upload your document and submit !)
- Virtually any other method you can think of, as long as I can receive it

I will acknowledge receipt of your email/message within two days or so, so that you don't worry that it did not reach me.

Please let me know at the end of your homework if you want a partial correction (i.e. hints toward the good answer if your answer is not correct, so that you can try it again if you want), or a total correction (complete solution to the problems).

Once again, I remind you about the discussion platform, if you have any trouble with the math or if you're thinking "how the hell do I answer that ? I'm stuck !"

Exercise n°1: k_∞ for a homogeneous medium (2 group diffusion) ✪

Starting from the definition of the slowing-down current, please show that, in the case of slowing-down in hydrogen, the following equalities hold:

$$q(u) = \rho(u)$$

$$\frac{dq}{du} + q(u) = \Sigma_s(u)\phi(u)$$

$$\frac{dq}{du} = S(u) - \Sigma_a(u)\phi(u)$$

Exercise n°2: Slowing down with resonant absorption ✪✪✪

Compute the slowing-down current and the flux in the three regions of the following configuration: