Computational homogenization for multi-group diffusion problems in neutronics

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A postdoctoral fellowship is proposed on the computational homogenization in neutronics. The objective is to develop efficient numerical approaches for a multi-group diffusion model with strong spatial heterogeneities, i.e. a model where the parameters, typically the coefficients of the equations, vary rapidly in space.

Many approaches exist and some of them are based on homogenization theory. This postdoctoral fellowship will be focused on the multiscale finite element method [**?**] and the heterogeneous multiscale method [**?**]. The advantage of these numerical model is that the computational cost remains reasonable, while capturing the rapid variation of the coefficients. In fact, if the mesh size is coarse compared to the characteristic length of the variations, the computation of the basis functions and/or of the discrete variational formulation takes into account the heterogeneities induced by these variations.

The study will consider a multi-group diffusion model used for industrial applications.

The projet may be refined according to the skills and interests of the candidate. It is expected that the candidate has a PhD either in Applied Mathematics or in Nuclear Physics, has a good publication record and a solid knowledge in numerical analysis. Feel free to contact us for any further information.

Keywords: Homogenization, Multiscale Problems, Finite Elements, Neutronics

Supervision: François Madiot (CEA, DEN, DM2S, SERMA) and Patrick Ciarlet (POEMS, ENSTA ParisTech). The succesful candidate will take up the position as soon as possible and will be based at CEA Saclay in Gif-sur-Yvette, *as well as at ENSTA in Palaiseau. The locations are a few kilometers away.*

References

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