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# Application of the volume averaging method to the problem of a moving granular porous medium driven by a multi-phase flow

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## Résumé

The Volume Averaging method has been successfully applied to the macroscopic description of various multi-phase media including fluid flows in fixed porous media, convection and boiling in fixed porous media, or particle suspension and solidification. On the basis of these previous works, this work is an attempt to extend the method to the problem of a moving granular porous medium with internal heat release, driven by a flow of gas and liquid. This situation is typically expected during a severe accident in a Sodium-cooled Fast neutron Reactor (SFR), when a bed of solidified debris of molten nuclear fuel and steel settles down on the Core catcher at the bottom of the primary vessel. The intense boiling of the sodium, induced by the radioactive decay of the fission products in the debris, drags the debris at the upper parts of the heap. This leads to the self-levelling of the debris bed, which has a significant impact on both its coolability and its neutron reactivity.

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