ID de Contribution: **31** Type: **Plenary talk**

Diffusion in the presence of microstructures: Does vesicle micro-dynamics enhance the signalling among plants macro-transport ?

jeudi 18 novembre 2021 14:00 (45 minutes)

The interplay between microscopic (lattice-based, SDEs, PDEs, etc.) models and macroscopic evolution equations leads to interesting questions in the classical theory of diffusion. Some of them are still in search for rigorous
answers. Upscaling of microscopic models, via a variety of techniques like renormalization, hydrodynamic limits, or homogenization, is usually a preferred methodological path. However, some useful problem settings are not the result of an averaging procedure. Hence, they require the explicit handling of models posed on separate space scales.

In this talk, we present a transport problem for signalling among plants in the context of measure-valued equations. We report on preliminary results concerning the modelling and mathematical analysis of a reaction-diffusion scenario involving the macroscopic diffusion of signalling molecules enhanced by the presence of a finite number of microscopic vesicles - pockets with own dynamics able to capture and release signals as a relay system. The coupling between the macroscopic and microscopic spatial scales relies on the use of a two-scale transmission condition and benefits of the posing of the problem in terms of measures. Mild solutions to our problem will turn to exist and will also be positive weak solutions. Preliminary numerical results will support some of our analytic results. A couple of open questions at the modeling, mathematical analysis, and simulation levels will be pointed out.

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References:

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