



Invité par l'Assemblée du Collège de France,
sur proposition du Professeur Jean-François JOANNY

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Mathematical Models of Active Matter

21 février > 21 mars 2023

Conférences en anglais

Le mardi de 16 h 30 à 17 h 30 – Salle 5

Active matter systems are a novel class of out-of-equilibrium systems consisting of agents that consume energy locally. The scales of such agents vary drastically from nanomotors to swimming bacteria, flock of birds, and crowds of humans. We will present an overview of mathematical studies of active matter. We will address the modeling, analysis, and simulation aspects of these studies, with the focus on the phase-field and free boundary PDE models for active gels as well as multiscale and homogenization models for active suspensions. While many such mathematical models have been analyzed numerically, we will demonstrate what analytical studies can bring to the table. We highlight stability analysis where analytical studies are particularly powerful since numerical instability may become conflated with physical instability and often rigorous analysis can be the judge. We will also present our joint work with experimentalists on modeling and simulations of active suspensions.

21 février 2023

Fundamentals of Mathematical Modeling of Active Matter.
Examples

7 mars 2023

Phase Field and Free Boundary Models of Active Gels

14 mars 2023

Stability Analysis in Free Boundary Models

21 mars 2023

PDE Models of Active Suspensions:
Homogenization and Multiscale Analysis

Les conférences sont gratuites, en accès libre, sans inscription préalable.