

Shape design combining with a mixing device in an algal raceway pond

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Microalgae are photosynthetic microorganisms whose potential has been highlighted in the last decade, especially for food, renewable energy and wastewater treatment. Nevertheless, finding optimal growth conditions for full-scale outdoor cultivation of microalgae remains challenging in practice. Mathematical models are therefore of great help to better manage this complex and dynamical system. The aim of this talk is to better understand how different factors such as the shape of topography and distribution of the light resource affect microalgae growth in raceway ponds. In this way, I will first show how the shape of the topography affects (or not) the algal growth. I will present a model which coupling the hydrodynamical movement with the photosynthesis system, then using this coupled model I will present the optimization problem associated with the topography to maximize the algal growth rate. The next part of the talk will then focus on a combination of the topography with a mixing device (such as paddle wheel) to investigate how they affects the algal growth. I will show the possible optimal mixing strategies along with the optimal shape of the topographies. Finally, I will end this talk with some numerical experiments and some perspectives of this work.

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Classification de Session: Exposés

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