Mathematical modeling and control of resource allocation in microorganisms

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Résumé

The growth of microorganisms is fundamentally an optimization problem which consists in dynamically allocating resources to cellular functions so as to maximize growth rate or another fitness criterion. Simple ordinary differential equation models, called self-replicators, have been used to formulate this problem in the framework of optimal and feedback control theory. I will explain how this approach can provide novel insights into the resource allocation strategies that microorganisms have evolved and how they can inform the modification of these strategies for applications in synthetic biology and biotechnology.

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