

MIMS現象数理カフェセミナー

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Determining the optimal coefficient of the spatially periodic Fisher-KPP equation that minimizes the spreading speed

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Abstract: Propagation phenomena appear in various fields of natural science, including population genetics, epidemiology, ecology and so on. The spatially periodic Fisher-KPP equation is among the classical models that describe propagation phenomena. From the viewpoint of ecology, this equation describes the expansion of the territory of invading alien species in a given habitat. The periodic coefficients of the equation represent an environment in which favorable zones and less favorable zones appear alternately in a periodic manner. The aim of this work is to analyze the influence of periodic environment on the invasion speed. In this talk, we discuss the problem of finding optimal periodic coefficient that minimizes the “spreading speed” under certain condition. The term “spreading speed” refers to the asymptotic speed of the propagating front of a solution with compactly supported initial data. From the ecological point of view, the spreading speed describes the invasion speed of alien species. Hence the problem means seeking the best disposition of environment to prevent the invasion of alien species. In order to solve this problem, we introduce a condition under which equality holds in an inequality about the spreading speed derived by Nadin.



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