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Uniform Persistence Analysis of the Bacteria Persister Model

In this talk, we will explore eigenvalue problems arising from nonlocal elliptic equations that model the population dynamics of a bacterial group with presenting the persisters and available resource. The nonlocal component originates from epigenetic inheritance, more broadly referred to as a birth-jump process. In this setting, an offspring may leave its parent's location immediately after birth. In our model, this mechanism captures the phenotypic variations between parents and their offspring. Our main interest lies in understanding how changes in available resources—such as nutrient effects that constrain bacterial growth—impact the overall population size, especially in the presence of persister cells that cannot be eradicated. To address this, we establish a link between the principal eigenvalue and changes in resource availability, and then apply the super solution and maximum principle technique to examine the continuity and monotonicity of these effects.