

On steady-state solutions of a 1-D chemotaxis model with volume-filling effect

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Abstract

In this paper, we investigate the qualitative properties of steady-state solutions for a 1-D chemotaxis model, which was introduced in [1–3] to model the volume-filling effect. More precisely, we will classify the existence or nonexistence of steady-state solutions, and if exist, the number of steady-state solutions based on the interval length, the spatial average of cell density and the chemotactic coefficient. These results provide insights on how the biological parameters affect pattern formation. In particular, our results indicate that there are at most finitely many non-trivial patterns for a generic class of parameters.

Keywords: chemotaxis, volume-filling effect, steady-state solutions.

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