On a chemotaxis system with periodic asympotic behavior

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We consider a chemotactic PDEs system for the density of a biological population "u" and a chemical substance "v" in a bounded domain $\Omega \subset \mathbb{R}^n$. The evolution of the system is described by a parabolic and an elliptic partial differential equation. In the first equation we consider a logistic growth term of the form $\mu u(1 + f(x,t) - u)$. Here, function f models the resources of the system and has the following periodic asymptotic behavior

$$\lim_{t\to\infty} \sup_{x\in\Omega} |f(x,t) - f^*(t)| = 0,$$

where f^* is a time-periodic function. Global existence in any dimension is studied. Under the condition on the constant chemosensitivity

$$2\chi < \mu$$

and suitable assumptions on the initial data and the function f, we prove that the solution of the system also has periodic asymptotic behavior, using a comparison method.

References

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