On two singularly perturbed systems

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We discuss the stationary solutions and the dynamics for the following two systems. The first comes from a population model while the second comes from superconductivity. We assume k is large.

$$(1) \quad \begin{cases} \dot{u} & = \Delta u + f(u) - kuv, & \text{in } \Omega \times [0, \infty), \\ \dot{v} & = \alpha \Delta v + g(v) - kuv, & \text{in } \Omega \times [0, \infty), \\ u & = v = 0, & \text{on } \partial\Omega, \\ u & \geq 0, \quad v \geq 0; \end{cases}$$

$$(2) \quad \begin{cases} \dot{u} & = \Delta u + f(u) - kv^2 u, & \text{in } \Omega \times [0, \infty), \\ \dot{v} & = \alpha \Delta v + g(v) - ku^2 v, & \text{in } \Omega \times [0, \infty), \\ u & = v = 0, & \text{on } \partial\Omega, \\ u & \geq 0, \quad v \geq 0. \end{cases}$$