

# Some systems with large interaction

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We discuss non-negative solutions of the system

$$\begin{cases} -\Delta u = u(a - v) & \text{in } D \\ -\Delta v = v(d - u) & \text{in } D \\ u = v = 0 & \text{on } \partial D \end{cases}$$

Here  $D$  is a smooth bounded domain.

This is a limit problem for a problem in mathematical biology (in particular population studies). We also discuss the related problem where we replace the  $v$  in the first equation by its square and replace the  $u$  in the second equation by its square. This is a limit problem for condensed matter problems.

We discuss the similarities and the differences of the two equations. In particular, we discuss the multiplicity of solutions.