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1. The Keller-Segel system in R^2 .

The Keller-Segel system in R^2 is the classical diusion model for chemotaxis, the motion of a population of bacteria driven by standard diffusion and a nonlocal drift given by the gradient of a chemoatractant, a chemical the bacteria produce. Depending on the value of the total mass, the equation could have a blow-up behavior (aggregation) or spread out to zero (diffusion). At the precise critical value, the resulting equation is important in gemetry, since it models a (positive) constant Gauss curvature surface.