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Self-propelled particles with quasi-Morse potential

Rich patterns are observed in self-propelled particles systems with Morse like interaction potential $U(x) = C_a e^{-|x|/\ell_a} - C_r e^{-|x|/\ell_r}$. However, the explicit forms of the observed patterns like flocks and mills are not available in higher dimension. In this talk, the potential is replaced by a quasi-Morse potentail [Carrillo *et.al*, 2013 Physca D], which consists the difference of two rescaled Bessel potentails. A few observed patterns can be obtained by solved some algebraic equations, leading to an extensive parametric study of the underlying particle system. The stability of certain patterns are also disccused.