Continuum equations of active matter based on Gaussian approximation

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A method is proposed to derive continuum equations from microscopic equations of motion of interacting self-propelled particles. In this method, it is supposed that the direction of particles is distributed approximately Gaussian. This helps to introduce a closed form for equations of Fourier modes. Comparing the solutions of obtained hydrodynamics equations and the results of truncation method with the microscopic simulations, it shows that in low noise intensities the former is much better approximation.