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Alignment of Rods and Partition of Integers, an Exact Solution

ELI BEN-NAIM, Los Alamos National Laboratory — We study dynamical alignment of rods, a process in which rods become parallel by pairwise interactions, and also, wiggle in a diffusive manner. With strong diffusion, the system is disordered, but with weak diffusion, the system is ordered. We present an exact solution for the nonlinear and nonlocal kinetic theory of this alignment process, at the steady-state. The Fourier transform is expressed as a function of the order parameter, and generally, the Fourier modes decay exponentially with the wave number. The order parameter is found as a root of a closed equation. This solution involves iterated partitions of the integer numbers.

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