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Coarse-grained dynamics of alignment in animal group models SUNG JOON MOON, SIMON LEVIN, YANNIS KEVREKIDIS — Coordinated motion in animal groups, such as bird flocks and fish schools, and their models gives rise to remarkable coherent structures. Using equation-free computational tools we explore the coarse-grained dynamics of a model for the orientational movement decision in animal groups, consisting of a small number of informed "leaders" and a large number of uninformed, nonidentical "followers." The direction in which each group member is headed is characterized by a phase angle of a limit-cycle oscillator, whose dynamics are nonlinearly coupled with those of all the other group members. We identify a small number of proper coarse-grained variables (using uncertainty quantification methods) that describe the collective dynamics, and perform coarse projective integration and equation-free bifurcation analysis of the coarse-grained model behavior in these variables.

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