Title:	Effect of Stochasticity and Variable Speed on Collective Dynamics of Finite Fish Schools
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Abstract:	Various mathematical models have been developed to understand schooling in fish. Most of these models are built on three main rules - alignment, attraction and repul- sion. They differ from each other in terms of defining social interactions and individual properties. However, the criticism of these models is that the model assumptions are unrealistic. In the majority of these models, individuals move at a constant speed, or their speed is independent of neighbours. Also, in most models, the position and orientation of all individuals are updated at the same time. Therefore neglecting the inherent stochasticity observed in a school of fish that results in ansynchronous changes in the direction of movement and neighborhood-dependent dynamic variation in the speed. In this thesis, we develop a more realistic model to understand schooling in fish. In our model, we incorporate both stochasticity and the ability of individuals to adjust their speed as a response to neighbours' behaviour. School size range from 10 to 60 and the model is two-dimensional. We find that cohesive groups and high polarisation is achieved through pairwise alignment and attraction. This is in contrast to direction averaging in Vicsek like models. We show that schools of all size are oblong and the density is equally distributed about the centre of the group.
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