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Swarming by Nature and by Design¹

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The cohesive movement of a biological population is a commonly observed natural phenomenon. With the advent of platforms of unmanned vehicles, this occurrence is attracting renewed interest from the engineering community. This talk will review recent research results on modeling and analysis of biological swarms with some connection to the design ideas for efficient algorithms to control groups of autonomous agents. For biological models we consider two kinds of systems: driven particle systems based on force laws and continuum models based on kinematic and dynamic rules. Both models involve long-range social attraction and short range dispersal and yield patterns involving clumping, mill vortices, and surface-tension-like effects.

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