



Ben-Gurion University of the Negev
Blaustein Institutes for Desert Research
The Swiss Institute for Dryland Environmental and Energy Research
Alexandre Yersin Department of Solar Energy and Environmental Physics

Long-range Acoustic Interactions in Insect Swarms - An Adaptive Gravity Model

Dr. Dan Gorbonos

*Weizmann Institute of Science, weizmann
Department of Chemical Physics*

Abstract

The collective motion of groups of animals emerges from the net effect of the interactions between individual members of the group. In many cases, such as birds, fish, or ungulates, these interactions are mediated by sensory stimuli that predominantly arise from nearby neighbors. But not all stimuli in animal groups are short range. We consider mating swarms of midges, which are thought to interact primarily via long-range acoustic stimuli. We exploit the similarity in form between the decay of acoustic and gravitational sources to build a model for swarm behavior. By accounting for the adaptive nature of the midges' acoustic sensing, we show that our "adaptive gravity" model makes mean-field predictions that agree well with experimental observations of laboratory swarms. Our results highlight the role of sensory mechanisms and interaction range in collective animal behavior. Additionally, the adaptive interactions open a new class of equations of motion, which may appear in other biological contexts.

Date & Location:

Tuesday, April 24, 2018, 11:00

Lecture room, Physics Building (ground floor)

YDSEEP WEEKLY SEMINAR

