

Abstract Submitted
for the DFD17 Meeting of
The American Physical Society

Aerodynamics of Ventilation in Termite Mounds¹ SHANTANU BAILOOR, Johns Hopkins Univ, NEDA YAGHOUBIAN, Florida State Univ, SCOTT TURNER, State Univ of New York, RAJAT MITTAL, Johns Hopkins Univ — Fungus-cultivating termites collectively build massive, complex mounds which are much larger than the size of an individual termite and effectively use natural wind and solar energy, as well as the energy generated by the colony's own metabolic activity to maintain the necessary environmental condition for the colony's survival. We seek to understand the aerodynamics of ventilation and thermoregulation of termite mounds through computational modeling. A simplified model accounting for key mound features, such as soil porosity and internal conduit network, is subjected to external draft conditions. The role of surface flow conditions in the generation of internal flow patterns and the ability of the mound to transport gases and heat from the nursery are examined. The understanding gained from our study could be used to guide sustainable bio-inspired passive HVAC system design, which could help optimize energy utilization in commercial and residential buildings.

¹This research is supported by a seed grant from the Environment, Energy Sustainability and Health Institute of the Johns Hopkins University.

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Date submitted: 30 Jul 2017

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