

Abstract Submitted
for the DFD19 Meeting of
The American Physical Society

Transport phenomena in porous structures in interaction with the atmospheric boundary layer SAURABH SAXENA, NEDA YAGHOUBIAN, Florida State University — This study lays emphases on the underlying physics of mass and heat transfer within porous structures found in the atmospheric boundary layer. The transport process in the porous media happens due to the variation in the structure surface temperature (induced by the variable solar fluxes) and instabilities in the atmospheric boundary layer turbulent flow. The study is inspired by the longstanding problem of the aeration function of soil-based animal-built structures in nature. Direct numerical simulation (DNS) is used to simulate the flow past and through porous media. The Navier–Stokes equations are modified using the Darcy–Brinkman–Forchheimer model to represent the porosity effect. To examine the effect of the natural and forced convection on the transport phenomena within the porous body, the system is further exposed to the diurnal surface temperature variation that is computationally simulated using detailed surface energy balance analyses.

Saurabh Saxena
Florida State University

Date submitted: 30 Jul 2019

Electronic form version 1.4