Abstract Submitted
for the DFD17 Meeting of
The American Physical Society

CFD Simulations to Improve Ventilation in Low-Income Housing ROSEMOND HO, CATHERINE GORLE, Stanford Univ — Quality of housing plays an important role in public health. In Dhaka, Bangladesh, the leading causes of death include tuberculosis, lower respiratory infections, and chronic obstructive pulmonary disease, so improving home ventilation could potentially mitigate these negative health effects. The goal of this project is to use computational fluid dynamics (CFD) to predict the relative effectiveness of different ventilation strategies for Dhaka homes. A Reynolds-averaged Navier-Stokes CFD model of a standard Dhaka home with apertures of different sizes and locations was developed to predict air exchange rates. Our initial focus is on simulating ventilation driven by buoyancy-alone conditions, which is often considered the limiting case in natural ventilation design. We explore the relationship between ventilation rate and aperture area to determine the most promising configurations for optimal ventilation solutions. Future research will include the modeling of wind-driven conditions, and extensive uncertainty quantification studies to investigate the effect of variability in the layout of homes and neighborhoods, and in local wind and temperature conditions. The ultimate objective is to formulate robust design recommendations that can reduce risks of respiratory illness in low-income housing.

Rosemond Ho
Stanford Univ

Date submitted: 01 Aug 2017 Electronic form version 1.4