

Abstract Submitted  
for the DFD14 Meeting of  
The American Physical Society

**Characteristics of contaminant deposition onto a cylindrical body surrounded by porous clothing**<sup>1</sup> MINKI CHO, JINWON LEE, Pohang Univ of Sci & Tech, HYUNSUK JUNG, HAEWAN LEE, Agency for Defense Development, POHANG UNIV OF SCI & TECH TEAM, AGENCY FOR DEFENSE DEVELOPMENT TEAM — In order to characterize the deposition pattern of air-borne contaminants on a human body protected by a garment, the air flow through the clothing and in the air gap between the clothing and the skin was numerically solved, and the deposition of the suspended contaminants on the skin was obtained over a wide variety of conditions—wind speed, human motion and clothing conditions. The penetrating air flow was sensitive to the pressure inside the air gap, for which a simple model was successfully formulated. Also the profile of the non-uniform deposition velocity or the Sherwood number could be well modeled based on the developing concentration boundary layer inside the air gap. The boundary layer thickness grew very rapidly, nearly proportional to the square of the distance from the front stagnation point, which is much different from any other boundary layer studied in many engineering fields before. A rather universal function for the distribution of deposition speed over a cylindrical body was obtained, which remained valid for a very wide range of conditions. The characteristics for non-uniform and/or periodic external wind due to human motion were also analyzed.

<sup>1</sup>This study is supported by Agency for Defense Development.

Minki Cho  
Pohang Univ of Sci & Tech

Date submitted: 24 Jul 2014

Electronic form version 1.4