

REAEROSOLIZATION OF HAZARDOUS MATERIALS: WHAT GOES DOWN, CAN GO BACK UP AGAIN

Velocity Visualization Flow Field Of Liquid Aerosols Approaching The Swatch Test Fabric

Hyunsook Jung Agency for Defense Development **Seung Jung Yu** Agency for Defense Development **Goonhyeok Kim** Agency for Defense Development **Heesoo Jung** Agency for Defense Development

On the battlefield, harmful biological and chemical (CB) substances could be deployed as aerosols, exhibiting mass transfer phenomena such as convection, diffusion, penetration, and bypass following the airflow in the contaminated environment. Additionally, the body movement of an individual soldier wearing a CB protective garment may cause external contaminated air to flow into the interior from discontinuous areas due to local deformation, called bellows effect. Airflow field measurement can provide quantitative information of air distribution and local air velocity which has a strong relationship with the protection effectiveness and the aerosol transportation in the field. To investigate the aerosol flow behavior and especially the momentum transfer to the flow approaching the swatch test fabrics for CB protective garment system, a two-dimensional (2D) high-speed particle image velocimetry (HS-PIV) measurements have been conducted in close proximity to the fabric in a swatch test cell. The cell was installed inside the closed-type wind tunnel and di(2-ethylhexyl) sebacate (DEHS) particles were provided into the test section through the rake with multi-perforated holes. The velocity fields of the DEHS aerosols were measured around the test fabrics in a variety of porosities in the free flow stream velocities of 1, 3, 5, and 10 m/s. The results show that free stream velocity in the wind tunnel and the porosity of the test fabrics varied significantly the velocity distribution in the flow field of the aerosols approaching the fabrics. However, the change in the face velocity of the fabrics showed a slight variation in the flow field of the aerosols. Moreover, DEHS aerosols that penetrated the swatch test fabric with distortion or bounced off to the fabric after the collision were directly visualized.