Human convective boundary layer and its interaction with room ventilation flow - DTU Orbit (09/11/2017)

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This study investigates the interaction between the human convectiveboundary layer (CBL) and uniform airflow with different velocity and fromdifferent directions. Human body is resembled by a thermal manikin withcomplex body shape and surface temperature distribution as the skintemperature of an average person. Particle image velocimetry (PIV) andpseudocolor visualization (PCV) are applied to identify the flow around themanikin's body. The findings show that the direction and magnitude ofthe surrounding airflows considerably influence the airflow distribution aroundthe human body. Downward flow with velocity of 0.175 m/s does not influencethe convective flow in the breathing zone, while flow at 0.30 m/s collides withthe CBL at the nose level reducing the peak velocity from 0.185 to 0.10 m/s.Transverse horizontal flow disturbs the CBL at the breathing zone even at0.175 m/s. A sitting manikin exposed to airflow from below with velocity of0.30 and 0.425 m/s assisting the CBL reduces the peak velocity in the breathingzone and changes the flow pattern around the body, compared to the assistingflow of 0.175 m/s or quiescent conditions. In this case, the airflow interaction isstrongly affected by the presence of the chair.

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