

Impact of Radiative, Thermal and Moisture Properties of Clothing on Human Thermal Comfort

Atsumasa Yoshida^{C, S}, Yasuhiro Shimazaki, Ryota Suzuki, Yusuke Mototake and Shin-ichi Kinoshita
Department of Mechanical Engineering, Osaka Prefecture University, Sakai, Osaka, Japan

There is increasing concern about the health effects of the severe thermal environment in urban spaces. An environmentally friendly improvement is required from the energy viewpoint, and clothing draws attention for its functions of thermal comfort. Clothing is one of six dominant factors for thermal comfort, and clothing has impacts on thermal exchange between the exterior environment and the human body and on transfer of solar radiation. Humans themselves are heat generators and they regulate body temperature through clothing. Clothing acts as a cushion against hotness, coolness, drying, moistness, and radiation. Therefore, getting the basic radiative, thermal, and moisture properties of clothing is a great help for better thermal comfort. Our approaches are measurements of radiative, thermal, and moisture properties, and sensitivity analysis for human feeling. Thermal feeling was examined using the human thermal load which is an index based on an energy balance equation. After the establishment of evaluation techniques for radiative, thermal, and moisture properties, numerical simulations were carried out to estimate the human feeling in urban spaces. In the simulation, the effect of temperature, humidity, clothing, surface coating, greening, and so on are considered. The radiative, thermal, and moisture properties of clothing influence the feeling of temperature and humidity, and the radiative property of clothing influences the feeling of direct solar radiation and also reflected solar radiation. And finally, the authors make a suggestion for human and eco-friendly urban design.