

Modelling the electrostatic potential and capacitances of a human walking

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Abstract:

Measurement of the electrostatic potential in humans when walking is a useful tool for characterizing floors and antistatic measures in industrial facilities. It is an important question from the point of view of ESD or Hazards and Electrostatic Comfort. However, charging of humans when walking is a complex process where many factors are involved: charge generation and separation during the contact of the shoes and the floor, conductivity of the shoes and the floor, ambient conditions, walking style, etc.

To better understand the physical phenomena involved during charging when walking, a finite element model is presented where capacitances and induced voltages can be calculated in different positions and conditions. There are some models in the literature [1][2][3] representing the human body capacitance and interactions, but the walking process has not been yet represented. In our work, we modify the model presented in [1] allowing movement of arms and legs (see figure). The model is electrostatic since time constants are very short compared to the speed of walking. Electrostatic discharges are not represented, but the conditions before an electrostatic charge can be simulated. Conductivity of materials can be added to the model to simulate the self discharge process.

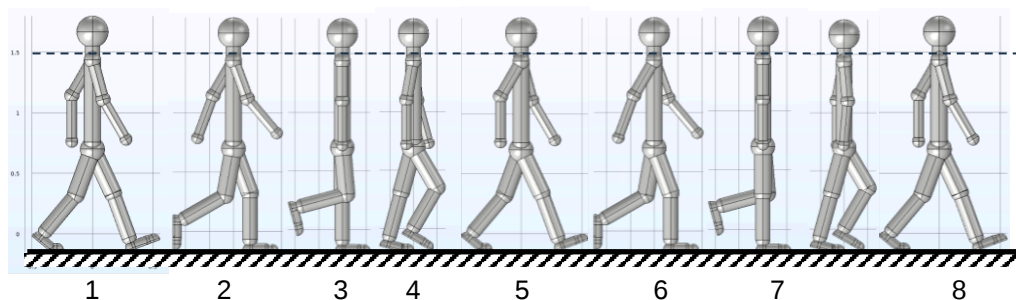


Figure. Different positions of the simulated human walking.

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