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Bioheat model with sectioned trunk to predict thermal response in non uniform environments

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To model and assess the response of a human model exposed to spatially non uniform environmental conditions, such as radiation heaters or cool air currents, it is useful to have a responsive bioheat model that accommodates these variations. Previous bioheat model included 25 body segments with cylindrical segments for each of the upper and lower trunk. The model, which incorporated arterial dilation and constriction and blood flow in superficial veins and AVA in fingers, predicted well temperature at the extremities in uniform environment for each segment. Since the human trunk has the largest surface area and metabolic generation, spatial variations in skin temperature are significant in affecting the overall thermal response which determines comfort. The aim of this work is to improve the previous bioheat model by dividing each of the two segments, upper and lower trunk, into four segments with two left and right segments at the front and two at the back. This addition of body segments allows variations in the skin temperature across the torso as well as the use of non-uniform environmental boundary conditions. These boundary conditions may include different exposure of each segment to ambient temperature, air currents, radiation, clothing, etc. The model is validated by comparisons with published experimental data showing good agreement.

Biography

W. Karaki is a Ph.D. student at the American University of Beirut at the Department of Mechanical Engineering.

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