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Observing Temperature Fluctuations in Humans Using Infrared Imaging

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Abstract

In this work we demonstrate that functional infrared imaging is capable of detecting low frequency temperature fluctuations in intact human skin and revealing spatial, temporal, spectral, and time-frequency based differences among three tissue classes: microvasculature, large sub-cutaneous veins, and the remaining surrounding tissue of the forearm. We found that large veins have stronger contractility in the range of 0.005-0.06Hz compared to the other two tissue classes. The wavelet phase coherence and power spectrum correlation analysis show that microvasculature and skin areas without vessels visible by IR have high phase coherence in the lowest three frequency ranges (0.005-0.0095 Hz, 0.0095-0.02 Hz, and 0.02-0.06 Hz), whereas large veins oscillate independently.

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