Investigation on the self-averaging property in the steady-state response of a tunneling percolation model for nonlinear composites: a semi-quantum approach

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We investigate whether the self-averaging property holds in the steady state response of a class of nonlinear composite/granular materials, using our semi-quantum *Random Resistor cum Tunneling Network* (**RRTN**) model, under the application of a uniform dc electric field. We have studied the *configuration average* of the steady state current, $\langle I \rangle$ and its *normalized fluctuation*, by calculating the dimensionless quantity, $\kappa=[\langle I^2 \rangle - \langle I \rangle^2]^{1/2}/\langle I \rangle$. Here, <...> denotes an ensemble averaged quantity, for the same system size L and the same ohmic concentration p of the conducting bonds in an insulating background. Under such considerations, we study the variation of the self-averaging property in different ohmic concentrations (p), voltages (V) and ambient temperatures (T).

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