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Electron Transport and Tunneling Resistance between Carbon Nanotube Fibers[1] PENG ZHANG, Y.Y. LAU, Univ of Michigan - Ann Arbor, J.W. LUGINSLAND, Air Force Office of Scientific Research, R.M. GILGENBACH, Univ of Michigan - Ann Arbor — The carbon nanotube (CNT) has exceptional intrinsic properties in its mechanical strength and stiffness, low density, and electrical and thermal conductivity [1]. However, on a macroscopic level, these outstanding properties, especially the electrical conductivity, remain elusive. The CNT fibers contain a very large number of junctions and contacts. It is therefore important to understand the electron transport through the contact between individual CNTs as well as the contact between CNT and the substrate. Based on a simple transmission line model, we study the tunneling resistance for a parallel contact formed between two closely spaced CNTs. The localized contact resistance along the contact region is modeled by the tunneling resistance, which is calculated from a recent self-consistent model [2]. The results give insights on the macroscopic electrical conductivity of CNT fibers.

[1] N. Behabtu, et al., Science, 339, 182 (2013).
[2] P. Zhang, Sci. Rep., 5, 9826 (2015).

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