Recent experiments have investigated the interplay of mechanical dynamics and electron transport in suspended carbon nanotube mechanical oscillators, including the observation of a variety of hitherto unexplained nonlinear phenomena [1, 2]. We model the dynamics from first principles using coupled Fokker-Planck equations and derive a corresponding nonlinear Fokker-Planck equation valid in the limit that the transport is fast compared with the mechanical dynamics [3]. This equation is solved numerically using the corresponding stochastic differential equations, and the mechanical dynamics investigated as a function of the applied voltages. The steady-state mechanical probability density is used to determine the steady-state current through the nanotube as a function of applied voltage. The current calculated is compared with recent experimental results.