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Modelling Nanoparticle Diffusion into Cancer Tumors VISHWA PRIYA PODDUTURI, Louisiana Tech University, Institute for Micromanufacturing, PEDRO DEROSA, Louisiana Tech University,Institure for Micromanufacturing. Grambling State University, Physics Department — Cancer is one of the major, potentially deadly diseases and has been for years. Non-specific delivery of the drug can damage healthy tissue seriously affecting in many cases the patient's living condition. Nanoparticles are being used for a targeted drug delivery thereby reducing the dose. In addition, metallic nanoparticles are being used in thermal treatment of cancer cells where nanoparticles help concentrate heat in the tumor and away from living tissue. We proposed a model that combines random walk with diffusion principles. The particle drift velocity is taken from the Hagen-Poiseuille equation and the velocity profile of the particle at the pores in the capillary wall is obtained using the Coventorware software. Pressure gradient and concentration gradient through the capillary wall are considered. Simulations are performed in Matlab using the Monte Carlo technique. Number of particles leaving the blood vessel through a pore is obtained as a function of blood pressure, the osmotic pressure, temperature, particle concentration, blood vessel radius, and pore size, and the relative effect of each of the parameters is discussed.

Vishwa Priya Podduturi
Louisiana Tech University, Institute for Micromanufacturing

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