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Inactivation of bacterial pathogens following exposure to UV-C light emitting diode array

Anbazhagi Muthukumar
Bharathiar University, India

Safe water is a national priority that affects every man, woman and child. Ensuring safe and quality water has become more complex task today, than at any point of time in the history. A wide variety of microbes have been linked to outbreaks of illness associated with contaminated water. Owing to the lack of a reliable method to achieve complete inactivation of these pathogens, greater vigilance is warranted in this area to control them. Inactivation of microorganisms using methods involving exposure to light is an area of increasing research. Hence the aim of the proposed study is to design a Ultra Violet-C Light Emitting Diode (UVC-LED) disinfection module for the simultaneous inactivation of selected pathogens such as *Salmonella*, *Shigella*, *Bacillus cereus*, *Listeria monocytogenes*, *staphylococcus aureus* and *Streptococcus* sp. Experiments were carefully conducted to ensure that the inactivation effects recorded were only due to the direct effects of UV-C Light emitting Diodes (UV-C LED). The results show, for the range of bacteria tested, that in general Gram-positive bacteria require a much lesser time exposure to UV-C Light for inactivation than do Gram-negative bacteria. The bactericidal effect of the UV-C LED suggests a promising application to inactivate pathogens and hence much more work is required to establish if this type of light sensitivity is a widespread phenomenon among diverse types of waterborne pathogens.

sanbazhagi@gmail.com

Radiative heat transfer in MHD mixed convection flow of molybdenum disulfide in water based nano-fluids for different shapes of nanoparticles along a vertical channel

Aaiza Gul
Universiti Teknologi Malaysia, Malaysia

The problem is solved using perturbation method by taking into account Hamilton and Crosser model. One of the boundary walls is oscillating in its own plane. Five different shapes (platelet, blade, cylinder, brick and spherical) of molybdenum disulfide nanoparticles are used inside water chosen as a conventional base fluid. A comparison of different shapes of molybdenum disulfide nanoparticles inside water based-nanoparticles is analyzed. Results obtained show that nanoparticles in platelet and cylinder shape has the highest thermal conductivity and viscosity compared to blade and spherical shapes molybdenum disulfide nanoparticles. Solutions for velocity and temperature are obtained and discussed graphically. Applications of molybdenum disulfide in water base fluids is discussed and derived mathematically. In cancer treatment the shape of nanoparticles is of great significance. Different shaped nanoparticles have different effect on cancer cells. For example, cylindrical shaped nanoparticles are seven times more deadly than traditional spherical nanoparticles when delivering drugs to breast cancer cells.

aaronscott1906@gmail.com