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Modelling the infectiousness of viruses when exposed to ultra-violet germicidal system: A computational fluid dynamics approach

Late 2019, the world started experiencing the advent of a new deadly disease (Coronavirus). Coronaviruses are widespread in humans and several other vertebrates and cause respiratory, enteric, hepatic, and neurologic diseases. There was relatively little information on the corona virus; consequently, the world was thrown into a state of pandemic as the virus spread across all continents with high morbidity and mortality. Due to the risk associated to coronavirus at the time, many studies have attempted to identify mitigation measures to reduce its infectiousness and understand its dynamics, evolution and control. Despite the numerous studies reported, there is limited modeling data that shows the decay process of the corona virus infectiousness in a confined environment, when subjected to ultra-violet germicidal irradiation (UVGI) system. Hence, in this study we report the results of a mathematical model that predicts the infectiousness of coronavirus while evolving using a computational fluid dynamic technique. Droplets containing coronavirus particles were injected into a fluid domain and allowed to move in the ambient flow, subject to illumination with UVGI in certain regions of the domain. Our modelling describes the viral concentration in the droplet and its reduction over time. The model can be used to predict infectiousness of the droplets when subjected to a UVGI system in different scenarios. Ultimately, the model will be used to inform and optimize the design of engineered interventions. This work will describe the details and benchmarking of the modelling.

Apply to be considered for a student ; award (Yes / No)?

No

Level for award;(Hons, MSc, PhD, N/A)?

No

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