ZOOM Lecture

Time: 9am Friday December 10, 2021 (Texas time Thursday, December 9, 7pm)

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Speaker

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Modeling and Computation of Modal Analysis of Coronavirus

Many math biologists study the Covid-19 pandemic by the usual math biology

methodology of predator-prey type reaction-diffusion models. The shortcoming of this approach is that it is mainly phenomenological and offers little help to vaccine designs. Instead, in this talk, we aim to investigate the coronavirus itself and hope to understand its behaviors in order to obtain some fundamental knowledge about the virus. Here, we present our recent research on the modeling and supercomputer simulation by examining the normal modes of vibration of a single coronavirus. The virus is modeled as an elastodynamic continuum. We take "samples" of coronavirus from the Internet resources. The vibratory mode shapes, as shown from post-processed supercomputer results as videos, manifest the fundamental motions from a small number of spikes to those of a higher number of spikes. As the mode sequential order increases, one can see more "breathing modes" in occurrence. We have also incorporated the effects of fractal features and those of fluids (such as blood or body fluids) in the model, and investigate how such vibratory motions differ from a single non-fractal shaped coronavirus. Eventually, a mid-term goal is to investigate coupled resonant motions between two or more viruses. All the modal analysis of virus vibratory motions will be visualized by video animations. Their significance is also interpreted. Questions will be welcome.

About the Speaker

Goong Chen