Biomedical Informatics Grand Rounds

Wednesday, September 28th, 2022 3:00 pm – 4:00 pm

On the Estimation of PTV of a Tumor Shape Under Kinematic Uncertainties

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Remote Access

Join Zoom Meeting https://stonybrook.zoom.us/j/95617197636?pwd=KytzZ2pVRG9SZGpKZUtpNXJISjNjZz09

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Bio: Jeff Ge has been on the faculty of Mechanical Engineering at Stony Brook University since 1993 and has been Professor and Chair of the department since 2016. He is a Fellow of ASME. He was Chair of ASME Design Engineering Division (2020) and ASME Mechanisms and Robotics Committee (2011). He was past chair of the US Member Organization of IFToMM (International Federation for the Promotion of Mechanisms and Machine Science) and currently serves as the chair of the Constitution Committee of IFToMM. Currently he is Editor of Mechanisms, ASME Journal of Mechanical Design. He was an Associate Editor of ASME Journal of Mechanical Design, ASME Journal of Mechanisms and Robotics as well as International Journal of Mechanics Based Design of Structures and Machines. He has over 180 journal and conference publications and holds 6 US patents and one European patent. In 2021, he was the recipient of ASME Mechanisms and Robotics Award, a lifetime achievement award given by ASME Design Engineering Division.

Abstract: This talk presents our recent research in studying the problem of estimating the PTC of a tumor shape under kinematic uncertainties, which is represented by a discrete set of displacements extracted from the image data. We focus on how the problem of computing the average and variance of a set of displacements can be formulated correctly. In the process, the notion of kinematic variances is introduced to quantify the kinematic uncertainties. As a PTV is considered as a swept volume of a tumor under displacement errors, we propose a new framework for kinematic analysis that extends the classical rigid body kinematics of infinite-sized space to that of finite shape. The new framework is expected to have applications in robotics and automation, well beyond PTV estimation.

Educational Objects: Upon completion, participants should be able to:

- Introduce fundamentals of kinematics
- Introduce the fundamentals of statistical analysis
- How to adapt statistical analysis methods to rigid body displacements
- Swept volume generation in the context of PTV

Disclosure Statement: The faculty and planners have no relevant financial relationship with ineligible companies whose primary business is producing, marketing, selling, re-selling, or distributing health care products used by or on patients.

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