BIOMATH SEMINAR

Friday, February 20

1-2 pm

Harris 4119

Inferring Continuous Data from Discrete Measurements

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Abstract: In a clinical setting, it is important to be able to extract the pancreatic insulin-secretion rate (ISR) and quantify beta-cell function from C-peptide measurements. Several models have been proposed in the literature, but they are sensitive to numerical interpolations. I will present an improved, two-compartment model. Using a smoothness norm, the model requires only a simple linear algebra calculation to yield an initial guess of the ISR. A cost function is defined in terms of the ISR's non-negativity, smoothness, and goodness-of-fit to the C-peptide data according to the two-compartment model. Finally a parallel-tempered Monte Carlo simulation is performed to predict the ISR and its associated statistics. The model's behavior for different time-discretization schemes is optimized. I will present results from the model when applied to hyperglycemic clamp data from impaired glucose tolerance (IGT) and type-2 diabetes (T2D) subjects, and compare the subjects' predicted ISRs.

Bio: Dr. Will Heuett received his BS in applied mathematics from the University of Colorado at Boulder and his PhD in applied mathematics from the University of Washington, Seattle. After receiving his PhD, Dr. Heuett completed a one-year postdoctoral fellowship at the University of Colorado at Boulder and a three-year postdoctoral fellowship in the Laboratory of Biological Modeling at the National Institutes of Health (NIH). He is currently an Assistant Professor of Mathematics at Marymount University in Arlington, VA. Dr. Heuett’s research is in the field of mathematical biology, and it relates to common matters such as weight change, exercise, and diabetes. He investigates the dynamics and regulation of human metabolism using an array of mathematical techniques.