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INSTRUCTIONALLY
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C H A N N E L
I S L A N D S

Undergraduate Math and Physics Seminar

Modeling of an Alcohol Biosensor Problem with Numerical Results

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Abstract: Our work is motivated by an alcohol biosensor problem in which the objective is estimating the BrAC/BAC (Breath Alcohol Concentration/Blood Alcohol Concentration) of individuals given their TAC (Transdermal Alcohol Concentration) based on population data that contains simultaneous BrAC/BAC and TAC measurements. With this goal in mind, we construct a mathematical framework in which we estimate the input to a random diffusion equation model given the output based on the population data. There are two main sub-problems to be solved: (1) a parameter estimation problem and (2) a deconvolution problem. Due to the uncertainty in the system and the desire to perform estimation based on the population data, we assume that the parameters in the model are random variables. So, the first step now becomes the estimation of the distribution of these random parameters whereas the second step is deconvolving input based on the output and the estimated distribution of the random parameters. We used this mathematical framework for the alcohol biosensor problem where BrAC/BAC (Breath Alcohol Concentration/Blood Alcohol Concentration) is the input and TAC (Transdermal Alcohol Concentration) is the output. We present numerical results representing how our approach works in practice by using actual clinical and field BrAC/TAC.



When: Monday, April 9, 2018, 4:30-5:20 pm

Where: CSUCI, Del Norte Hall 1530

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