Design of a parameter estimation method for the stochastic process

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Available real-time measurement data are limited for most nano-scale systems. For this reason, it is important to develop highly efficient parameter estimation methods that can provide accurate estimates of unknown parameters using a limited number of measurements. The phenomena occurring at the molecular scale are inherently stochastic and the least-square method often gives highly suboptimal estimates of unknown parameters. In this study, the probabilistic density function based parameter estimation methods using such as the maximum likelihood estimation or maximum a posteriori estimation are used to obtain estimates for the adsorption and desorption parameters of a carbon nano-tube (CNT) based sensor, which can be converted into local concentration measurements at nano-scale. Performance of the proposed stochastic estimation method will be compared against that of the least squares method.