1135-35-2234 **Melissa Guemo Ngamini*** (melissa.ngamini@morehouse.edu), 170 Northside Dr SW, 109, Atlanta, GA 30313. *Nonlinear Filtering Problems for systems governed by PDEs.*

The Kalman filter is one of the very essential discovery for the last century and provides estimate of state and parameters. It works well if the dynamics are nearly linear but it requires improvements for significantly nonlinear and non-Gaussian system.

In this presentation we introduce an improved variation of the Kalman filter for large scale nonlinear stochastic systems based on the Gaussian filter. This is an approach based on the optimal filtering theory; i.e., the optimal filter based on the Bayes' formula for discrete time dynamics and the Zakai equation for continuous time.

That is, we develop the filtering update via the assumed Gaussian density filter. A key step is that we update the covariance in the square root factors form and thus we update the square root factors of the Gaussian covariance. This evolves into the reduced Gaussian filter based on the reduced factor updates. For dissipative system, we develop an alternative to the reduced Gaussian filter, by the assumed covariance filter. For systems that are time reversible, we use the time reversal filter and use the quasi reversible method for mildly diffusive system which are systems that are not time reversible.

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