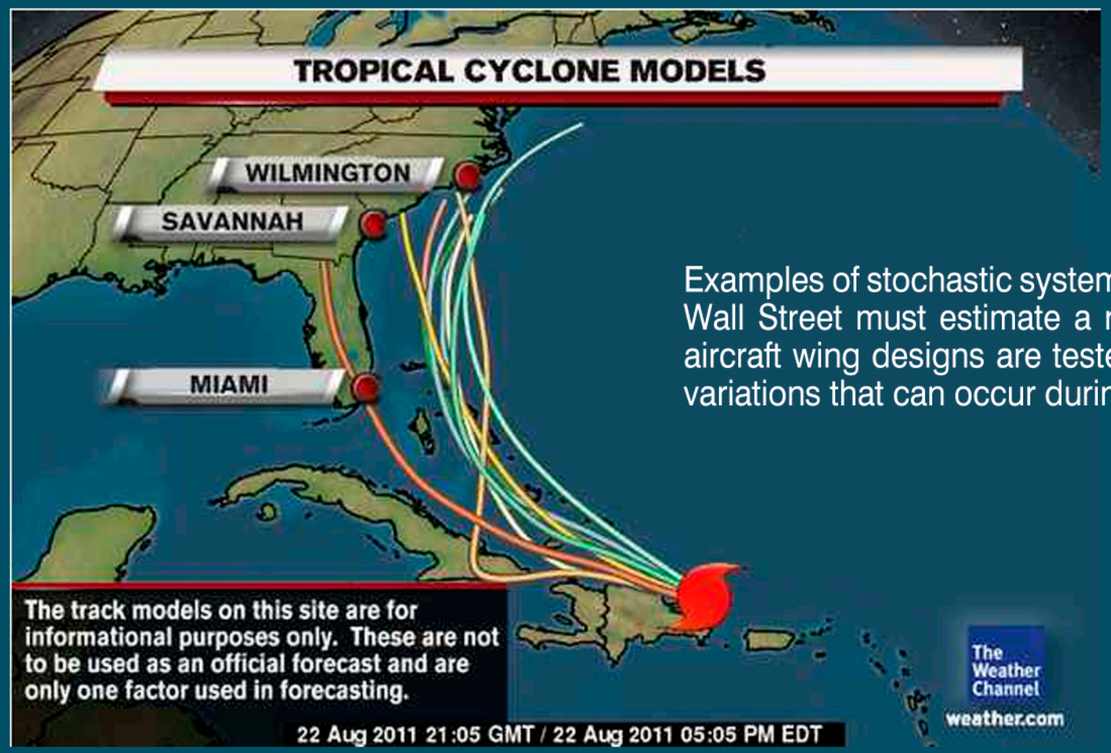
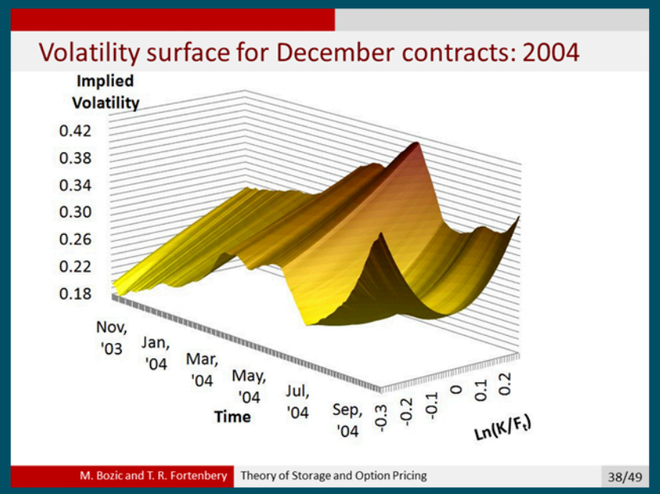
# *Numerical Methods for Stochastic Differential Equations*

Stochastic differential equations describe systems containing uncertainty. The uncertainty might be an inherent part of the thing we are studying, or it might simply be due to practical limitations in measurement or knowledge. Classical techniques could only handle such problems by replacing uncertain quanitities by estimates; the modern approach deals directly with the uncertainty, allowing it to affect the computation in ways that could never be studied before.




Examples of stochastic systems are everywhere. Hurricane forecasts must incorporate uncertainty in the weather patterns; Wall Street must estimate a reasonable price for financial instruments based on the historical variability in price; new aircraft wing designs are tested by bending them severely, so to pass the test, developers must estimate the structural variations that can occur during the manufacturing process.

An entire new area of computational science has sprung up over the last 20 years to try to handle such problems. This includes new models of random processes, methods for describing how uncertainty interacts with a system, and computational procedures for simulating uncertain systems and extracting statistical information. Many of these approaches require the use of high performance and parallel computing clusters.




This class covers the applied mathematics and the numerical analysis necessary to design, simulate and analyze scientific and engineering models that contain a stochastic component. In particular, we will look at the formulation and solution of stochastic differential equations, using Monte Carlo and other methods.

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Tuesdays and Thursdays 2:00-3:15, 217 HCB

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