Modulbeschreibung für Vertiefungsmodule des Wahlpflichtbereiches

Titel des Moduls	Einführung in die Stochastische Filtertheorie und deren Anwendungen
In englischer Sprache	Introduction to the theory of stochastic filtering and its applications

R	
A	X

	Vorlesung	Übung
Umfang	2	

Inhalt

In the theory of stochastic processes, the filtering problem is one of the most attractive problems from the point of view of theoretical results and potential applications. The aim of stochastic filtering is to provide some kind of of the *best estimate* for an evolving unobservable stochastic process (usually modeled by a Gaussian process or a Markov chain), called the *signal*, given only some noisy partial *observations* of the system. Practical applications are being found for an increasing number of theoretical results and practical problems have also stimulated the development of the theory.
As an application, one can consider the following model of a financial market in which the firm issuing the asset can regulate the dividend rate paid to share holders. Assume that the firm policy allows only two possible states for the dividend rate. Roughly speaking, the firm can be either in a *good* or a *bad* economic state, so that the dividend rate may take only two values, according to the economic state of the firm. We further assume that, being inaccessible to small investors trading in the market, the future dividend policy of the issuing firm is hidden into the dynamics of the asset prices, under the risk-neutral probability measure. From the point of view of such investors, the firm's future dividend policy and thus the dynamics of the dividend rate can be described by a continuous Markov chain with two states. Suppose that the dynamics of the underlying asset prices are described by a geometric Brownian motion with a random drift rate having the following structure with respect to the risk-neutral probability measure. We assume that the drift switches its rate from one constant value to another, according to the change of the state of the continuous time Markov chain. We provide a filtering dividend rate estimate based on the observed asset price process and consider the problem of pricing of European-type options in this model.
The lecture course will be organized as follows: discrete time Gaussian signal in Gaussian observations – discrete time hidden Markov chains in Gaussian observations – continuous time Gaussian signal in Gaussian observations – continuous time hidden Markov chain in Gaussian observations – applications to financial mathematics.

Voraussetzungen	Stochastik I

Regelsemester	

Abschluss	Prüfung

Prüfungszulassungsvor-aussetzung	keine

Studienpunkte	4

R = Reine Mathematik
A = Angewandte Mathematik