A Stochastic Measure Theoretical Approach for Solving Nonlinear Stochastic Optimal Control Problems

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Abstract

In this paper, nonlinear Stochastic Differential Equations (SDEs) solved by a new approach. In this approach a nonlinear SDE governed by a nonlinear Stochastic Optimal Control (SOC) problem. Then the nonlinear SOC is converted to an equivalent problem in stochastic measure space, by using Weiner stochastic measure and Riesz stochastic representation theorem. The new stochastic optimization problem in the stochastic measure space is transformed to a Stochastic Linear Programming (SLP) problem, by a new approach that we called stochastic atomic measure theory. This approach leads to an approximate solution for original nonlinear SOC problem.

Keywords: Nonlinear stochastic equations, Ito's integral, stochastic optimal control, Wiener stochastic measure, measure theory, stochastic linear programming, approximation.

On study of debt crises using stochastic optimal control

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Abstract

In this paper we use stochastic optimal control and dynamic programming to model an optimal foreign debt and show why divergences of the actual debt from the optimal debt make a country vulnerable to crises.This model suggest important variables which may serve as warning signals to predict crises.

Keywords: Optimal debt, Dynamic programming, Stochastic optimal control, Warning signals of debt.

Analytical and Numerical Solutions of Different Parabolic Heat Equations Presented in the form of Multi-term Fractional Differential Equations

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Abstract

In this article, we study the analytical solutions of different parabolic heat equations with different boundary conditions in the form of multi-term fractional differential equations. Then we compare these analytical solutions with numerical finite difference methods. This comparison shows a good accuracy of both analytical and numerical methods presented here.

Keywords: Parabolic heat equations, fractional differential equations, finite difference methods