



**The Hong Kong Polytechnic University  
Department of Applied Mathematics**

# **Colloquium**

**On**

## **Quadratic and Superquadratic Backward Stochastic Differential Equations and Related Partial Differential Equations**

**by**

**Professor Ying Hu  
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Ying Hu is a Professor and the Head of “Stochastic Processes” Research Group at Universite de Rennes 1, France. He was educated at Fudan University, where he got his Ph.D. He is a co-director of an international program signed by the universities of Bretagne Occidentale, of Maine, of Rennes 1 and Shangdong. His research interests included Probability and Stochastic Processes; Stochastic Differential Equations and Backward Stochastic Differential Equations; Control and Optimisation; Mathematical Finance; Probabilistic Methods for Partial Differential Equations; Potential Theory. He had published more than 50 research papers from 1990-2001.

### **Abstract**

We begin by the study of the problem of the exponential utility maximization. As opposed to most of the papers dealing with this subject, the investors trading strategies we allow underlie constraints described by closed, but not necessarily convex, sets. Instead of the well-known convex duality approach, we apply a backward stochastic differential equation (BSDE) approach. This leads to the study of quadratic BSDEs. The second part gives the recent result on the existence and uniqueness of solution to quadratic BSDEs. We give also the connection between these BSDEs and quadratic PDEs. The last part will show that quadratic BSDE is critical. That is, if the BSDE is superquadratic, there exists always a bounded terminal random variable for which the BSDE admits no bounded solution; and there are infinite many bounded solutions when there is one bounded solution. This phenomenon does not exist for quadratic and superquadratic PDEs.

**Date : 8 Aug, 2011 (Monday)**

**Time : 2:00pm - 3:00pm**

**Venue : Departmental Conference Room HJ610  
The Hong Kong Polytechnic University**

**\*\*\* ALL ARE WELCOME \*\*\***