

# Stochastic differential games for fully coupled FBSDEs with jumps

by

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## Abstract

This paper is concerned with stochastic differential games (SDGs) defined through fully coupled forward-backward stochastic differential equations (FBSDEs) which are governed by Brownian motion and Poisson random measure. First we give some basic estimates for fully coupled FBSDEs with jumps under the monotonic condition. We also prove the well-posedness and regularity results for fully coupled FBSDEs with jumps on the small time interval under a Lipschitz condition (where the Lipschitz constants of  $\sigma$ ,  $h$  with respect to  $z$ ,  $k$  are small enough) and a linear growth condition. For SDGs, the upper and the lower value functions are defined by the controlled fully coupled FBSDEs with jumps. Using a new transformation, we prove that the upper and the lower value functions are deterministic. Then, after establishing the dynamic programming principle for the upper and the lower value functions of this SDGs, we prove that the upper and the lower value functions are the viscosity solutions to the associated upper and the lower Hamilton-Jacobi-Bellman-Isaacs (HJBI) equations, respectively. Furthermore, for a special case (when  $\sigma$ ,  $h$  do not depend on  $y$ ,  $z$ ,  $k$ ), under the Isaacs' condition, we get the existence of the value of the game.

It's based on a common work with Qingmeng Wei (School of Mathematics, Shandong University, Jinan 250100, P. R. China).