Stochastic differential games involving impulse controls and double-obstacle quasi-variational inequalities

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We study a two-player zero-sum stochastic differential game with both players adopting impulse controls, on a finite time horizon. The Hamilton-Jacobi-Bellman-Isaacs (HJBI) partial differential equation of the game turns out to be a double-obstacle quasi-variational inequality, therefore the two obstacles are implicitly given. We prove that the upper and lower value functions coincide, indeed we show, by means of the dynamic programming principle for the stochastic differential game, that they are the unique viscosity solution to the HJBI equation, therefore proving that the game admits a value.

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