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Antagonistic Games with an Initial Phase †

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Abstract: We formalize and investigate an antagonistic game of two players (A and B), modeled by two independent marked Poisson processes forming casualties to the players. The game is observed by a third party point process. Unlike previous work on this topic, the initial observation moment is chosen not arbitrarily, but at some random moment of time following initial actions of the players. This caused an analytic complexity unresolved until recently. This, more realistic assumption, forms a new phase ("initial phase") of the game and it turns out to be a short game on its own. Following the initial phase, the main phase of the game lasts until one of the players' cumulative casualties exceed some specified threshold. We investigate the paths of the game in which player A loses the game.

Keywords: *noncooperative stochastic games; fluctuation theory; marked point processes; Poisson process; ruin time; exit time; first passage time.*

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