

OPTIMAL STOPPING AND STRONG APPROXIMATION THEOREMS.

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ABSTRACT. Strong approximation theorems known also as (strong) invariance principles provide uniform (in time) almost sure or in average approximations (as opposed to the convergence in distribution) in the central limit theorem type results which is done by redefining in certain ways corresponding random variables or vectors on one probability space without changing their distributions. Three methods are known at present to provide appropriate constructions and they yield also estimates of approximation errors. In this talk we are interested in error estimates for approximations of values of Dynkin's optimal stopping games with payoff processes which are Lipschitz functionals of the Brownian motion by values of sequences of Dynkin's games with payoff processes converging to payoffs of original games. The strong approximations described above play a crucial role here but we have to face an additional substantial complication to have all stopping times defined with respect to the same filtration. The Skorokhod embedding method is well suited for this purpose but it does not work in the multidimensional case where another method should be applied. The most precise quantile method of strong approximations does not seem to work for this type of problems and the question about optimality of error estimates is not clear yet. The results are new for convergence of corresponding Snell's envelopes, as well, and they are motivated, in particular, by financial mathematics applications of approximations of fair prices of American and game (Israeli) options.