Optimal Stopping and Reselling of European Options

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Abstract. European options can only be exercised at maturity, there however exist the possibility to resell the option on the open market. A bivariate exponential diffusion process with correlated components represented by a geometric Brownian motion and a mean-reverse Ornstein-Uhlenbeck process are used to model the price process and the stochastic implied volatility in the reselling model. In this way, the reselling problem is imbedded in the problem to find the optimal reward for an American type option based on this process and a non-standard pay-off function given by the Black-Scholes formula. An approximative bivariate tree model is constructed and convergence of the optimal expected reward for this tree model to the optimal expected reward for the corresponding American type option is proved.

Keywords European option; American option; optimal stopping; binomial-trinomial approximation; Convergence.