# Optimal stopping time problem with random lifetime

Anna Krasnosielska
Elżbieta Ferenstein
Faculty of Mathematics and Information Science, Warsaw University of Technology
Faculty of Mathematics and Information Science, Warsaw University of Technology
Polish Japanese Institute of Information Technology

**Abstract.** We present a full-information best choice problem with random lifetime. The interpretation of the random lifetime can be as follows: as a random number of offers or as a time at which the offers are observed. In both cases we can consider the problem with random starting time or random horizon. We present the theorem that the optimal stopping time problem with random horizon can be transformed to optimal stopping time problem without random horizon but with new structure of rewards. In detail we discuss an optimal stopping time problem with a Poisson stream of offers, a random horizon and a random starting time. The offers are assumed to be i.i.d. random variables. A special case is known as the Elfving stopping time problem.

**Keywords** optimal stopping; random lifetime; Poisson process