Povzetek

V diplomskem delu je predstavljena metoda Monte Carlo za numerično integriranje. V uvodu so na kratko predstavljene klasične mrežne metode in njihove pomanjkljivosti pri računanju večkratnih integralov, ter kratka zgodovina in osnovna ideja metode Monte Carlo. Ker gre za metodo, ki temelji na naključnih številih, so v drugem poglavju prikazani izreki in definicije iz verjetnosti in statistike, ki jih potrebujemo. V nadaljevanju je poudarek na metodi Monte Carlo, generiranju naključnih števil in izboljšavah metode.
V drugem delu je predstavljeno numerično integriranje s kvazi Monte Carlo metodami in generiranje kvazi naključnih števil. Na koncu je nekaj numeričnih primerov in razprava o uporabnosti metode.

Ključne besede: Monte Carlo metoda, numerično integriranje, naključna in kvazi naključna števila, kvazi Monte Carlo metoda.

Abstract

An introduction to Monte Carlo methods for integration problems is presented. After an overview of the classical numerical quadrature rules, difficulties in high dimensions and an introduction to probability and statistics, Monte Carlo integration with variance-reducing techniques is described. Next, a short description on the generation of pseudo-random numbers is given and methods to generate samples according to specified distributions are discussed.
In the second part Quasi Monte Carlo integration with generation of quasi-random numbers is introduced. Finally, some numerical examples and applications of Monte Carlo methods are given.

Key Words: Monte Carlo methods, numerical integration, random and quasi-random numbers, Quasi Monte Carlo methods.

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