

VIRTUAL MAGNETIC RESONANCE IMAGING - PARALLEL IMPLEMENTATION IN A CLUSTER COMPUTING ENVIRONMENT

Krzysztof Jurczuk, Marek Krętowski

Faculty of Computer Science, Białystok Technical University, Białystok, Poland

Abstract

In this paper, we present a virtual scanner of magnetic resonance imaging that aims at simplifying and accelerating methods of generating images. After an introduction to the subject of nuclear magnetic resonance and various approaches to the simulation of magnetic resonance imaging, details of the simulator are described. The proposed simulator consists of magnetization kernel (based on a solution of the Bloch equation), graphical user interface and module that performs calculation in a parallel environment. The package which parallelizes the magnetic resonance simulation is implemented on a computing cluster with the use of the Message Passing Interface standard. The parallel module can divide calculations related to different slices or different phase encoding steps between processors. The experimental results in the parallel environment show that it is possible to gain a significant speedup thus making it possible to acquire more exact images in a reasonable period of time.

Keywords: medical imaging, simulation of magnetic resonance imaging, cluster computing