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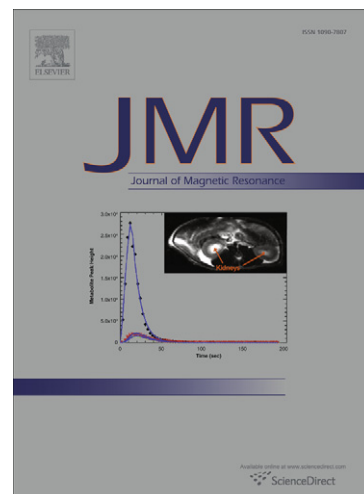
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Single-sided magnetic resonance profiling in biological and materials science

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Abstract

Single-sided NMR was inspired by the oil industry that strived to improve the performance of well-logging tools to measure the properties of fluids confined downhole. This unconventional way of implementing NMR, in which stray magnetic and radio frequency fields are used to recover information of arbitrarily large objects placed outside the magnet, motivated the development of handheld NMR sensors. These devices have moved the technique to different scientific disciplines. The current work gives a review of the most relevant magnets and methodologies developed to generate NMR information from spatially localized regions of samples placed in close proximity to the sensors. When carried out systematically, such measurements lead to ‘single-sided depth profiles’ or one-dimensional images. This paper presents recent and most relevant applications as well as future perspectives of this growing branch of MRI.

Key words: Single-sided NMR, Mobile NMR, MRI, depth profiles, Permanent magnets, Magnet design, stray field

1. Introduction

Magnetic resonance imaging (MRI) measurements have been first conceived for bulky magnets built from superconducting coils in which samples are placed. This closed geometry ensures high field strength as well as high homogeneity of the static magnetic field B_0 .

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