

Tissue characterisation using MRI methods for multi-component relaxation time mapping

Quantitative MRI is of great interest for the assessment of numerous human diseases, such as the breast or prostate cancers^{1,2}, but also for other fields, such as plant physiology³ or geology. However, classical MRI methods are often limited to measurements of mono-component relaxation times.

Original approaches for measuring multi-component relaxation times have been recently proposed in the NMR field^{4,5}. In these methods, the diffusion and relaxation phenomena are combined by using the complete expression of the NMR signal, making it possible to perform selective measurements of the T_2 relaxation times corresponding to different components of a complex system. The aim of this project is to adapt the NMR technique for selective relaxation time assessment to MRI. The phenomena influencing T_2 measurements, such as the susceptibility effects and the imperfection of the RF pulses will be also investigated.

The method will be developed on the specific designed phantom and then validated on the fruit samples, but it could be easily adapted for other application fields.

A 1.5 T MRI scanner (Siemens, Avanto) will be used in this study for experiments and sequence programming (IDEA).

The applicant should have a background in MRI or NMR. Skills in computer programming (C++) would be of advantage.

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References :

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