

MRI and Navier-Stokes Equations: How do they relate for a better exam?

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Abstract. Magnetic resonance imaging (MRI) is an important medical imaging modality used for diagnosis, disease prevention / monitoring and treatment planning. MRI produces excellent quality anatomical and functional images, in particular blood flow images. Considering that 31% from the causes of death on adults in 2019 worldwide are related to heart disease, using MRI to diagnose and prevent cardiovascular diseases is in many cases necessary. However, its high costs plus prohibitive examination times can limit its use in the cardiovascular scenario, showing the need for acceleration. This talk aims to present how anatomical and blood flow images are acquired. As well as the image reconstruction techniques based on under-sampled acquired signals. Also in the context of under-sampling, show how the Navier-Stokes equations (NSE) can be used to assist the reconstruction process, and thus accelerate MRI examination. Finally, some computational and theoretical difficulties about the model based MRI acceleration problem will be briefly treated, as well as some benefits in addition to the acceleration.