

Acoustic frequency tool for the analysis of MR gradient pulse sequences

- Visualization of acoustic frequencies caused by switching of gradients during an echo planar sequence as secondment with ULeipzig ER C. Labadie

During a scan a preselected set of defined radio frequencies and gradient pulses are repeated many times, wherein the time interval between pulses and the amplitude and shape of the gradient waveforms will control the NMR signal reception. Specific pulse sequences weightings are dependent on the field strength.

The creation of large magnetic fields within whole body MRI scanners is exacerbated by the need to switch the gradients rapidly, particularly in faster imaging methods (echo planar imaging, EPI). The resulting Lorentz forces and consequent torques applied to the coil structure together with individual wire movements can advance high level of undesirable acoustic noise. [Chapman 1995]

Various approaches have been used to reduce acoustic noise emissions since the loud noises might be amplified and become dangerous for the safety of the patient (possibly hazardous to hearing, physiological consequences, permanent hearing loss) [McJury 2000, Li 2008, Shellock1998, Moelker 2004]. Newer pulse sequences are high intensity, impulse/impact noises that may cause discomfort to patients as well as anxiety in the test environment and a possible loss of hearing for susceptible individuals. [Counter 1997]. Possible hearing damage approx. 120 dB [Wikipedia]

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