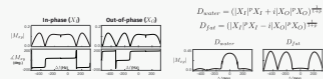


Tradeoff Between Fat-Suppression and Partial-Voluming in Weighted Combination Alternating Repetition-Time Balanced SSFP

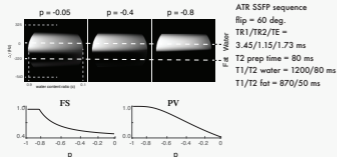
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Ankara/Turkey program# L06.09

p-norm Combination



Simulated Phantom



Background

- Balanced SSFP yields high SNR efficiency within short scan times.
- Multi-acquisition fat/water separation selectively suppress the fat resonance
- Linear combination ATR SSFP puts strict limitation on TR ^[1]
- Weighted combination SSFP (WCSSFP, p-norm combination) yields more uniform stop-band ^[2]

We propose p-norm combination of ATR SSFP for improved fat-suppression, while relaxing TR limits

We propose a guideline to select the optimal p-norm

FS & PV

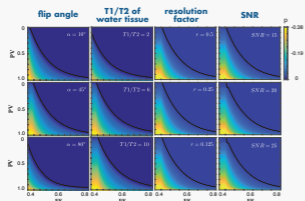
- Pass-band of water: 0, 80 Hz
- Pass-band of fat: -220, 80 Hz
- whole range: [-300, 80] Hz
- r: ratio of water signal in pass-band to water signal in whole off-resonance range
- c: water ratio of voxel

$$FS(p) = \log_{10} \frac{D_{w,pass}(p)}{D_{f,pass}(p)}$$

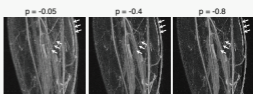
$$PV(p) = \frac{\int_0^1 r(c, p) dc - \int_0^1 r(c, 0) dc}{\int_0^1 r(c, -1) dc - \int_0^1 r(c, 0) dc}$$



Optimal p-norm



MIPs of lower leg angiograms



ATR SSFP sequence on 1.5T GE scanner
 flip = 60 deg.
 TR1/TR2/TE = 3.45/1.15/1.73 ms
 FOV = 19.2cm
 T2 prep time = 80 ms
 recovery time = 3s

References

- [1] Jaine, S. et al., NIPS 2018
- [2] DeWitt, I., PNAS 2012



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