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Magnetic Resonance Imaging sequence programming

Zigzag EPI with Sinusoidal Gradient

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Method—Blipped EPI

Drawback:

- noice: round 110-120dB

Reason:

- frequent and sharp switch of gradient field

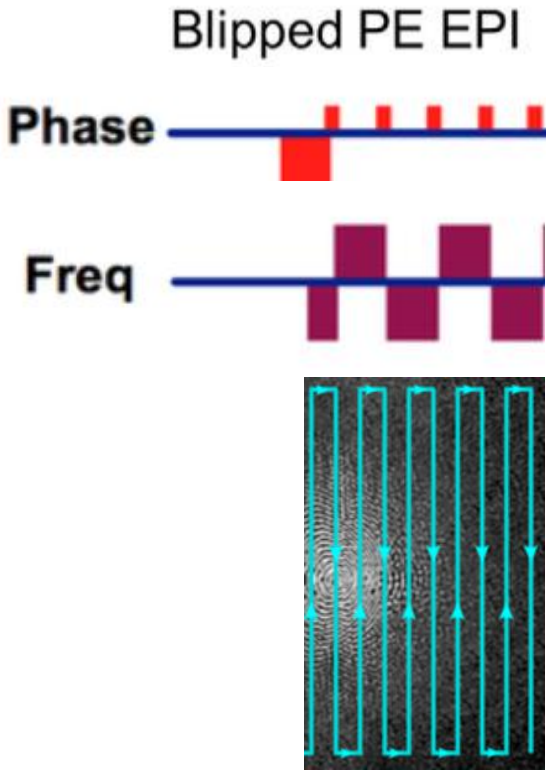

Fig. 1. Blipped Phase Encoding EPI with Sinusoidal Gradient
Source: https://mriquestions.com

Method—Sin Zigzag EPI

Pros:
- quite

Reason:
- smooth gradient trajectory due to sin gradient

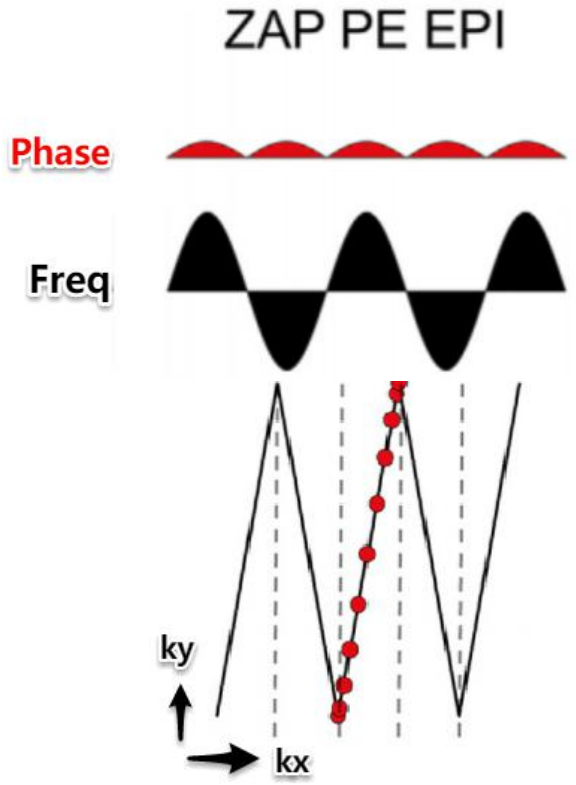

Fig. 2. Zigzag-Aligned-Projections Phase Encoding EPI with Sinusoidal Gradient [2]

Image Result of Sin Zigzag EPI

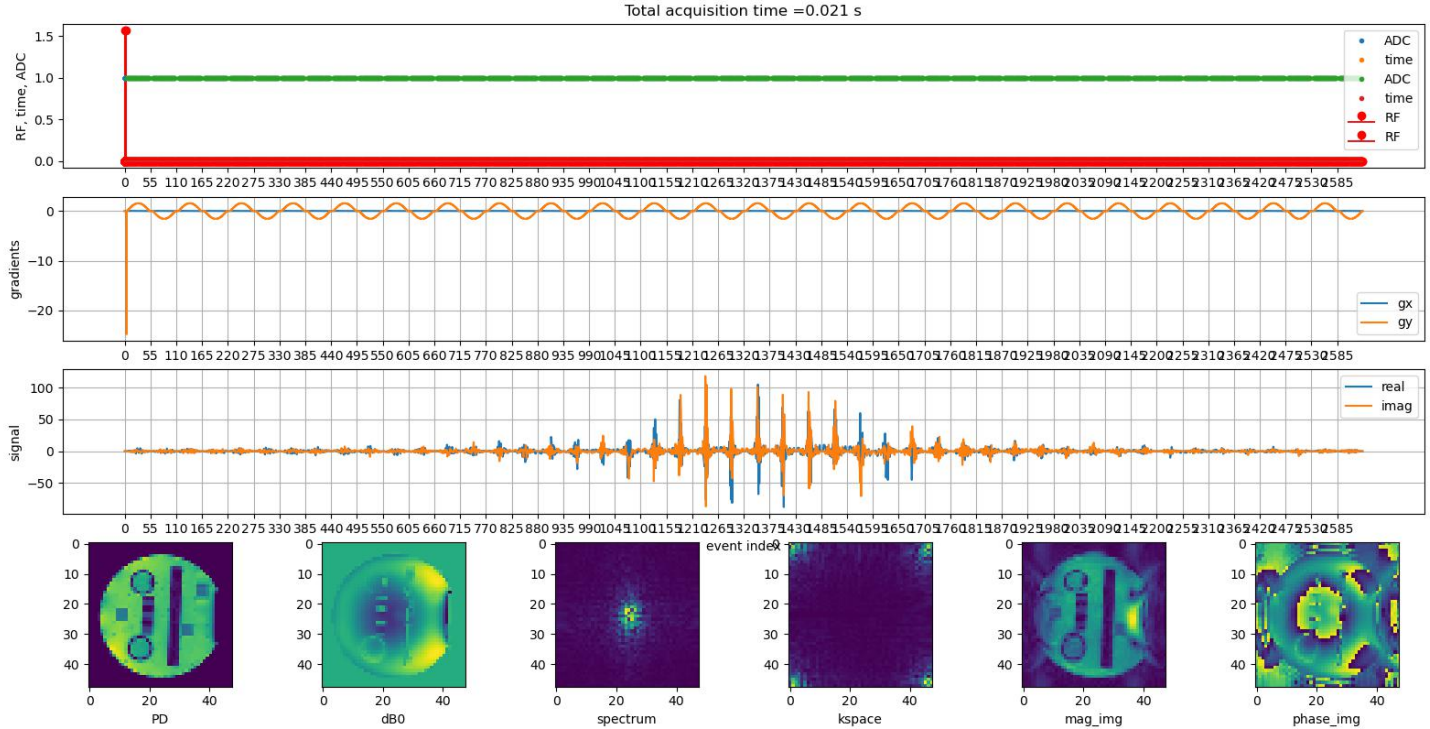

Fig. 3.Image Result of Zigzag EPI with Sinusoidal Gradient

K-space result of Sin Zigzag EPI

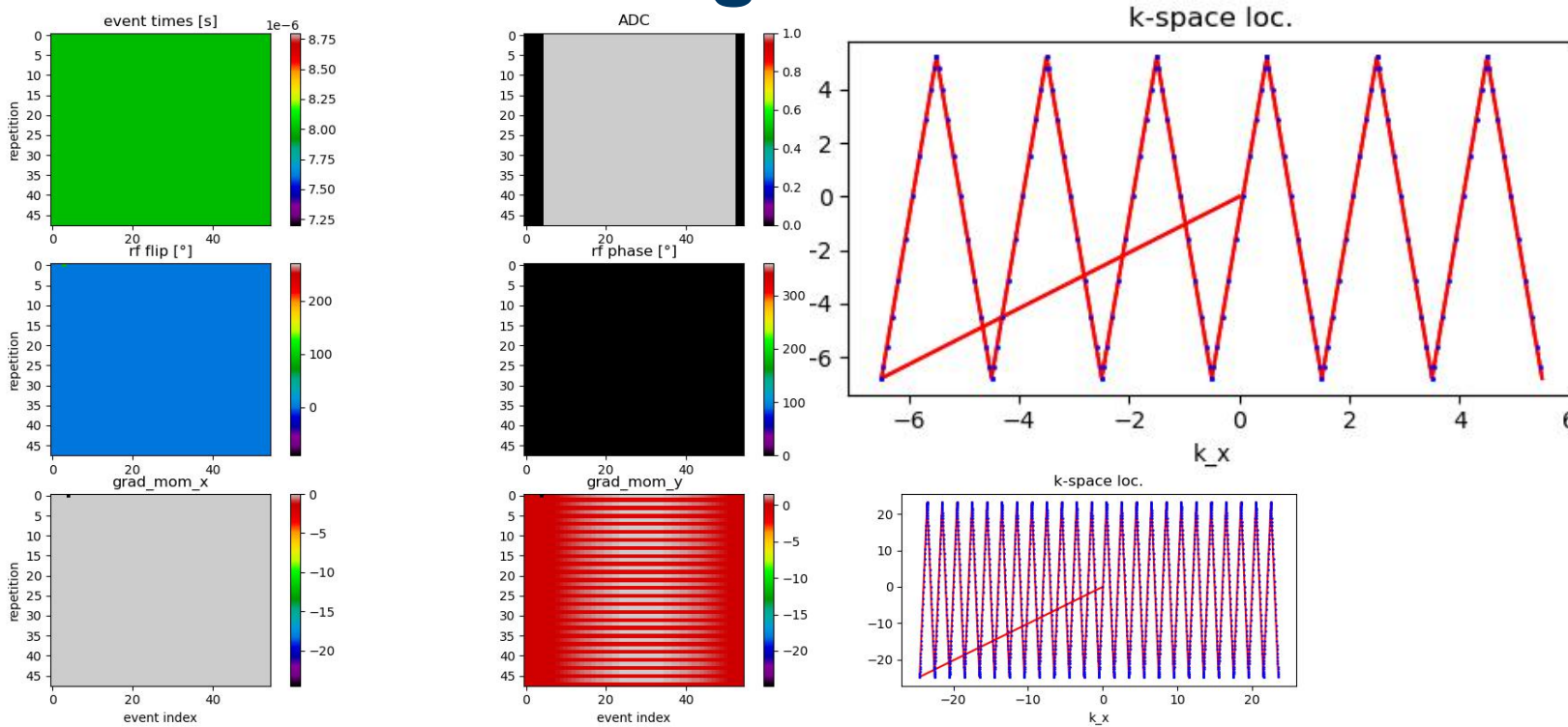

Fig. 4.K-space Result of Zigzag EPI with Sinusoidal Gradient

Midpoint correction comparison

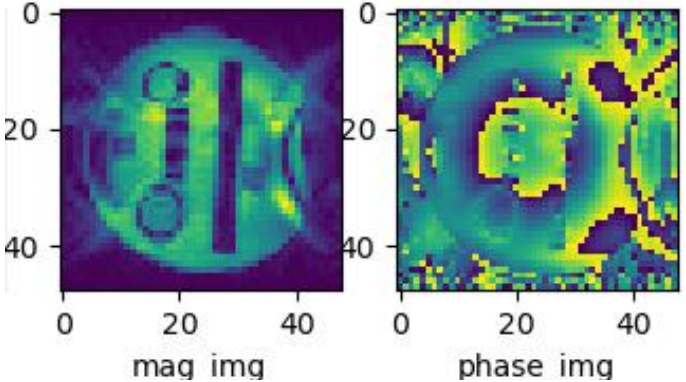

Fig. 5. Zigzag EPI with Sinusoidal Gradient without midpoint correction

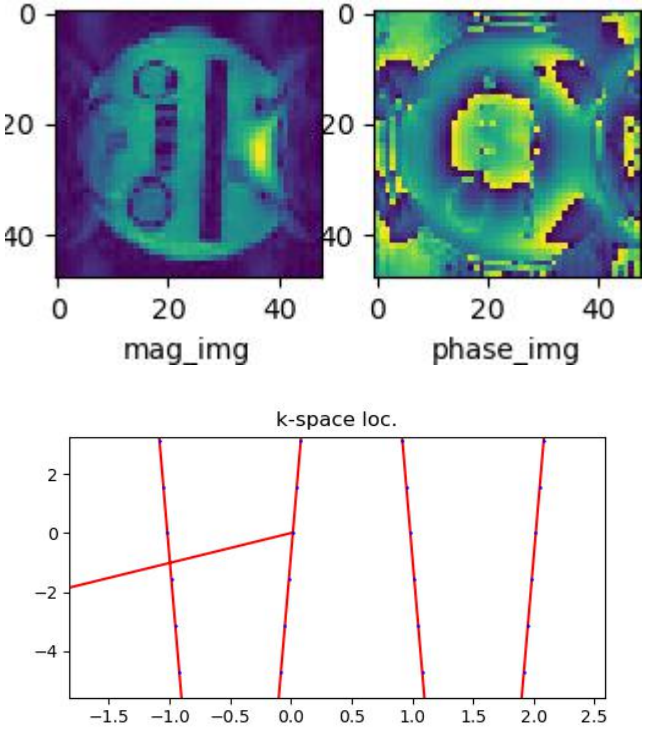

Fig. 6. Zigzag EPI with Sinusoidal Gradient and midpoint correction

Com. between normal and zigzag sin EPI

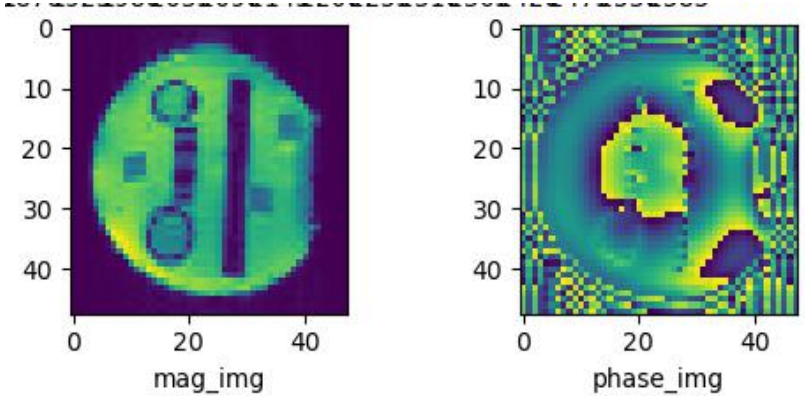

Fig. 7. Nnormal EPI without Sinusoidal Gradient

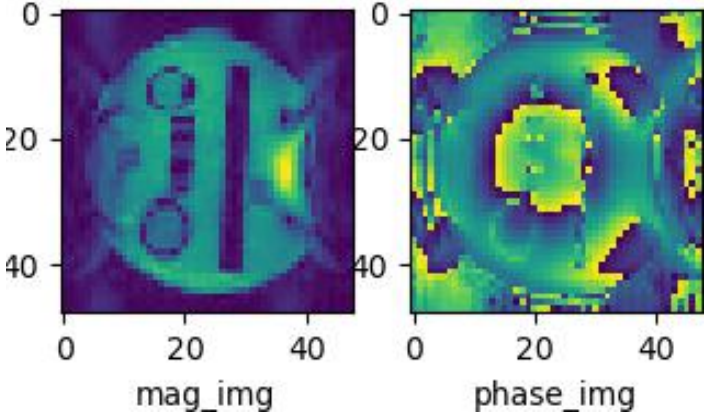

Fig. 6. Zigzag EPI with Sinusoidal Gradient and midpoint correction

Referrence

[2] Patrick Liebig, Robin M. Heidemann, Bernhard Hensel & David A. Porter *Accelerated silent echo-planar imaging*. ELSEVIER 2019. 55: 81–85.