

Optimal Dual-VENC Unwrapping in Phase-Contrast MRI

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© 2018 IEEE. Dual-VENC strategies have been proposed to improve the velocity-to-noise ratio in phase-contrast MRI. However, they are based on aliasing-free high-VENC data. The aim of this paper is to propose a dual-VENC velocity estimation method allowing high-VENC aliased data. For this purpose, we reformulate the phase-contrast velocity as a least squares estimator, providing a natural framework for including multiple encoding gradient measurements. By analyzing the mathematical properties of both single- And dual-VENC problems, we can justify theoretically high/low-VENC ratios such that the aliasing velocity can be minimized. The resulting reconstruction algorithm was assessed using three types of data: Numerical, experimental, and volunteers. In clinical practice, this method would allow shorter examination times by avoiding tedious adaptation of VENC values by repeated scans.