4-D CARDIAC C-ARM COMPUTED TOMOGRAPHY
Two Approaches to Dealing with Angular Undersampling

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Electrocardiogram Gating

Motion Compensation
(in Analytical Reconstruction)

Temporal Regularization
(in Algebraic Reconstruction)

Abstract
C-arm CT-based interventional assessment of cardiac function could prove highly useful. However, for clinically feasible scan protocols, time-resolved reconstruction is extremely challenging due to massive angular undersampling of the trajectory. We show two ways to effectively utilize all available data and thereby improve image quality: Non-rigid motion compensation and temporally regularized reconstruction.

Optimization problem: Non-rigid registration
• Computationally expensive
• Requires (and enforces!) a motion model
• Familiar visual characteristic
• Reliance on preliminary reconstruction

Optimization problem: Reconstruction
• Expensive, but “embarrassingly parallel”
• Requires (and enforces!) an image model
• Somewhat “cartoon-like” appearance
• Trade-off: Resolution vs. smoothness

Application: Interventional Analysis And Visualization of Cardiac Function

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