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Controlled Cardiac Computed Tomography

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Abstract

Cardiac computed tomography (CT) has been a hot topic for years because of the clinical importance of cardiac diseases and the rapid evolution of CT systems. In this paper, we propose a novel strategy for controlled cardiac CT that may effectively reduce image artifacts due to cardiac and respiratory motions. Our approach is radically different from existing ones and is based on controlling the X-ray source rotation velocity and powering status in reference to the cardiac motion. We theoretically show that by such a control-based intervention the data acquisition process can be optimized for cardiac CT in the cases of periodic and quasiperiodic cardiac motions. Specifically, we formulate the corresponding coordination/control schemes for either exact or approximate matches between the ideal and actual source positions, and report representative simulation results that support our analytic findings.

 Abstract

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