

**Generation of Synthetic 4D Cardiac CT Images for Guidance of Minimally Invasive Beating Heart Interventions****Feng P. Li** - robarts.ca**Martin Rajchl** - robarts.ca**James A. White** - lhsc.on.ca**Aashish Goela** - lhsc.on.ca**Terry M. Peters** - robarts.ca

Off-pump beating heart surgery requires a guidance system that would show both pertinent cardiac anatomy and dynamic motion both peri- and intra-operatively. Optimally, the guidance system should show high quality images and models in a cost-effective way and can be easily integrated into standard clinical workflow. However, such a goal is difficult to accomplish by a single image modality. In this paper we introduce a method of generating a synthetic 4D cardiac CT dataset using a single (static) CT, along with 4D ultrasound images. These synthetic images can be combined with intra-operative ultrasound during the surgery to provide an intuitive and effective augmented virtuality guidance system. The generation method obtains patient specific cardiac motion information by performing non-rigid registrations between pre-operative 4D ultrasound images and applies the deformation to a static CT image to deform it into a series of dynamic CT images. Validations was performed by comparing the synthetic CT images to real dynamic CT images.

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