

COMBAT-VT

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COMBAT-VT:

NURBS-based isogeometric analysis of a bi-ventricular heart model

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MOTIVATION AND OBJECTIVE

Computer simulations provide information that can be used by clinicians to support decision-making (Computational-model-based decision support = COMBAT) regarding the treatment of Ventricular Tachycardias (VTs). It is the goal of this COMBAT-VT subproject to develop efficient and robust models that can be integrated into the clinical workflow.



SIMULATION WORKFLOW

Our simulation framework combines the **Isogeometric Analysis** (IGA) simulation paradigm [1] with image recognition techniques to obtain patient-specific computer models (Fig. 1 & 2). Simulations will be performed directly on a Non-Uniform Rational B-Spline (NURBS) biventricular geometry. Computational costs are improved because of the limited number of control points that quantify the geometry.





REFERENCES

[1] Hughes, T. J. R. et al. (2005). Isogeometric analysis: CAD, finite elements, NURBS, exact geometry and mesh refinement, Comput. Methods in Appl. Mech. Eng., 194.39, 4135 - 4195.

[2] Bovendeerd, P. H. M. et al. (2009). Determinants of left ventricular shear strain. Am J Physiol Heart Circ Physiol. 297(3):H1058-68.

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Prediction

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