

A Method for the Registration of 3D Blood Vessel Models based on CT and Ultrasound Imaging

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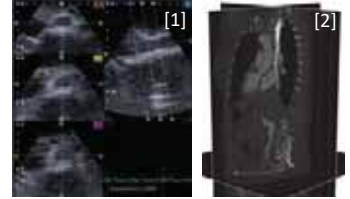
Background

- The criteria for the surgical treatment of life-threatening abdominal aortic aneurysms (AAAs) are based on diameter and growth rate.
- These criteria, derived from statistical distributions, are not individual and therefore not applicable to all patients.
- Biomechanical modeling is used to find more meaningful, patient-specific factors for surgery indication.



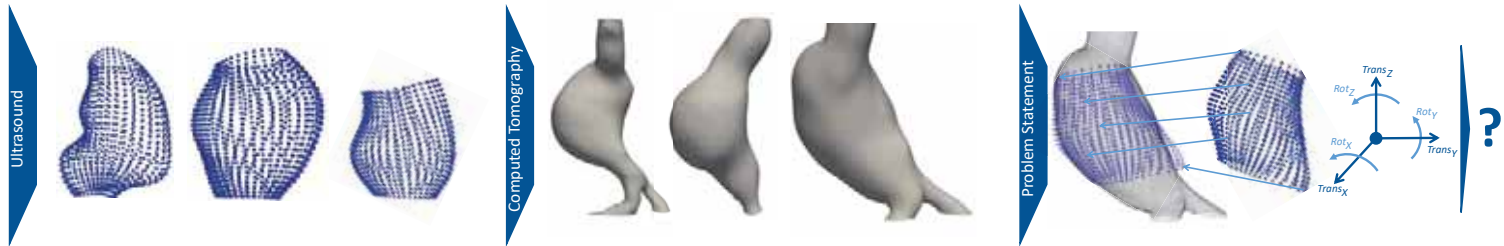
Motivation

- Various imaging modalities with different advantages can be used to find those new predictors.
- Ultrasound (US) imaging [1] provides dynamic information but only a segment of the AAA. Computed Tomography (CT) [2] provides the whole geometry but just a static picture.
- To use the advantages of both imaging modalities, a registration algorithm for the alignment of both geometries is needed.



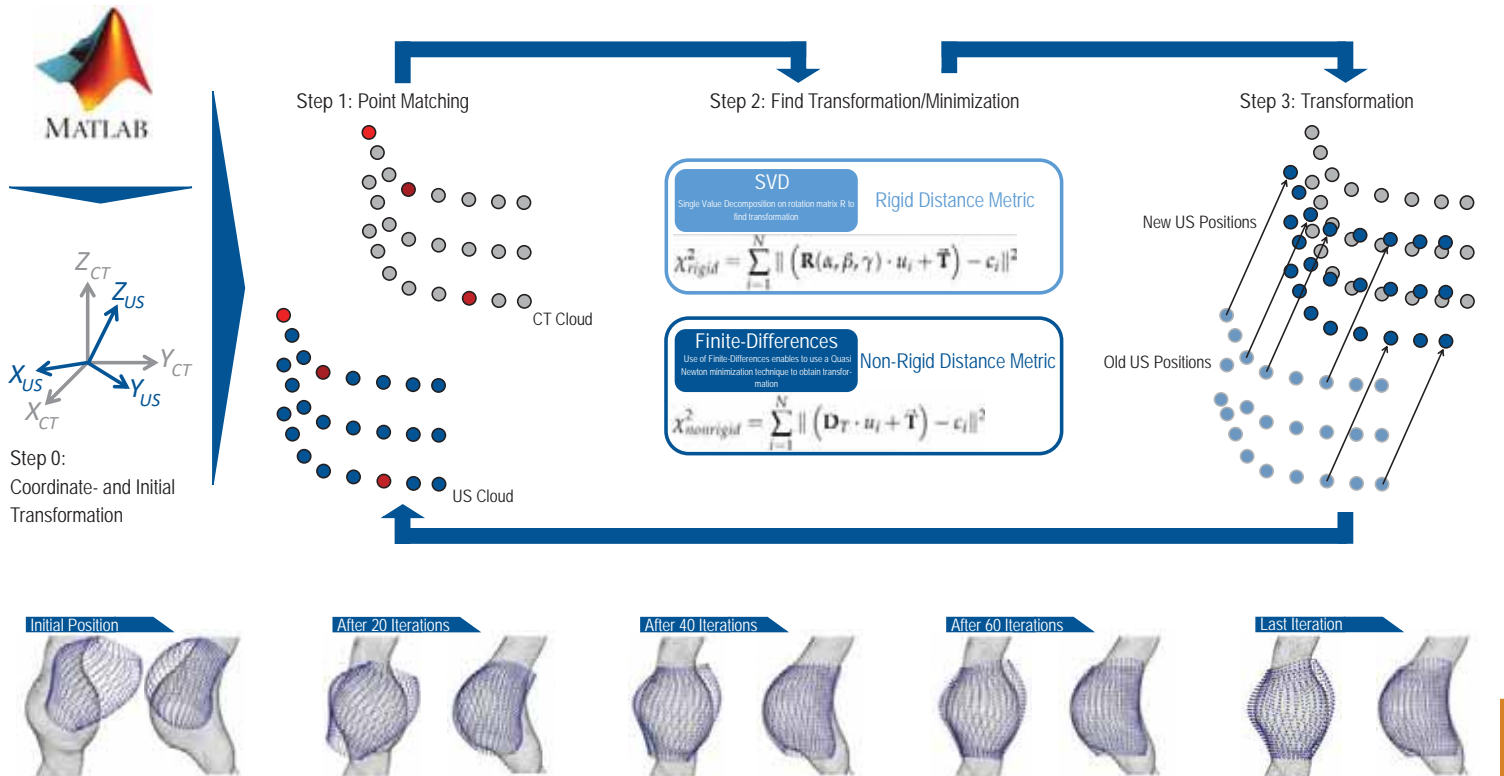
Material and Methods

1 Patient Specific 3D Blood Vessel Models from Volumetric Image Data

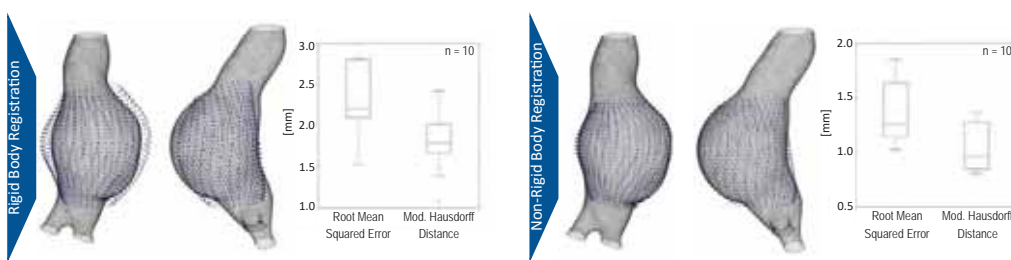


2 Registration Routine

Registration using an ICP (Iterative Closest Point) algorithm, which iteratively performs the steps 1-3:



Results



Conclusion and Outlook

- Implemented registration routine works stable and reliable.
- The wall geometries obtained by US and CT imaging show very good agreement.
- „Hybrid-Models“ based on US and CT imaging possible [3] by mapping of the dynamics (US) onto the AAA wall geometry (CT) via registration.

