Blood Vessel Mechanical Properties Related Vascular Deformation Model for Virtual-reality Catheter Simulator

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Abstract - The virtual-reality simulator assisted robotic catheter operation system plays important role in endovascular interventional surgery since it is able to provide image information for physicians. Based on patient-specific CT or MRI files, the vascular geometrical model is easily built in VR simulator. However, the geometrical model doesn’t satisfy the vessel deformation demand. In order to describe its deformation, firstly we adopt standard linear solid model (SLSM) to simulate vascular physical properties. Due to the fact that the parameters in SLSM are responsible for deformation, next we use to vascular elasticity analytical results to identify these parameters. As result, the parameters are related to vascular radius and material. Finally, through curvature estimation method on meshed surface, we have the knowledge of vascular radius corresponding discrete vessel surface. In this way, formulated vascular physical model in VR simulator is capable to deform according to vascular radius and material properties.

Context-Oriented Medical Visualization with Floating Images

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Abstract - As the next stage of medical visualization technology with floating images, we are working on augmenting the volume slicing image with context information. By fast automated scanning of the display screen, we show the surrounding region of the volumetric image, so the afterimage puts the currently viewed slice into context. We expect that this helps forming a correct three-dimensional understanding. Another method we are trying out is to insert physical (3D-printed) objects into the view, overlayed with the volume slicing image. This is expected to work as a guide for the user when scanning through the images. We report on experiments with these techniques.