

Finite element model of membranes for surgical simulators

Yasushi Embutsu¹, Takahiro Yamada¹ and Kazumi Matsui¹

¹Department of Environment and Information Sciences, Yokohama National University,
79-7 Tokiwadai Hodogaya-ku, Yokohama, Japan

E-mail: embutsu-yasushi-vk@ynu.ac.jp (Y.Embutsu)

We develop a laparoscopic surgery simulator and surgery navigation system using physical properties proper to each patient. The finite element models of internal living human body which are constructed by CT images are described by using nearly incompressible hyperelasticity materials. In order to predict the deformations of soft tissues with patient posture or express the reaction forces caused by contacts with organs and instruments as accurately as possible, it is important to acquire anatomically correct models and physical properties of each patient. In this paper, we discuss modeling and mechanical properties of membranes such as peritoneum with consideration of anisotropy and initial tension.

Keywords: Surgical simulator, Hyperelasticity, Soft tissue, Membrane, Anisotropy, Initial tension