Research Report (September, 2021- September, 2022)

Enrollment from September 2021

Department of modern mechanical engineering   Yasutoshi Taniguchi

I. List of Papers

[1] **Y. Taniguchi**, K. Takizawa, Y. Otoguro, and T.E. Tezduyar, "A hyperelastic extended Kirchhoff–Love shell model with out-of-plane normal stress: I. Out-of-plane deformation", *Computational Mechanics*, **70** (2022) 247–280, doi:10.1007/s00466-022-02166-x.

II. List of Talks

[2] **Y. Taniguchi**, K. Takizawa, and T.E. Tezduyar, "A Kirchhoff–Love shell formulation based on isogeometric discretization, considering stress in the thickness direction: comparison between plane stress shell", in *Proceedings of the Union Conference on Japan Society for Industrial and Applied Mathematics 2021*, Online due to the COVID-19, (2021).

[3] **Y. Taniguchi**, K. Takizawa, and T.E. Tezduyar, "An isogeometric hyperelastic shell analysis: boundary condi- tion", in *Proceedings of JSME 34th Computational Mechanics Division Conference*, Online due to the COVID-19, (2021).

[4] **Y. Taniguchi**, K. Takizawa, and T.E. Tezduyar, "A shell formulation of red blood cell using skalak's constitu- tive model", in *Proceedings of JSME 32th Biofrontier Conference*, Online due to the COVID-19, (2021).

[5] **Y. Taniguchi**, K. Takizawa, and T.E. Tezduyar, "A hyperelastic kirchhoff–love shell model with out-of-plane normal stress", in *The 15th World Congress on Computational Mechanics (WCCM XV) and the 8th Asia–Pacific Congress on Computational Mechanics (APCOM VIII)*, Online due to the COVID-19, (2022).

[6] **Y. Taniguchi**, K. Takizawa, and T.E. Tezduyar, "A hyperelastic extended kirchhoff–love shell model with out-of-plane normal stress", in *Japan Science and Technology Agency (JST), SESSION "Young Mathematicians" Challenge"*, Online due to the COVID-19, (2022).

III. Research Results in AY2021

In last year, I formulated ①A hyperelastic extended Kirchhoff—Love shell newly accounting for out-of-plane normal stress and ②the mechanics of red blood cell membrane by using shell theory.

IV. Research Plan for AY2022

By using new shell, I will computation contact mechanics of heart valves, and fluid-structure interaction problem between heart valves and blood. I will also consider the space-time formulation of them.