

Stance postural control in consideration of neurological time delay based on a musculoskeletal model

Creating a physiologically plausible neural controller contributes to understandings on the nature of human postural control. Most previous studies simplified human body model to an inverted pendulum without muscles, which hinders our understandings how muscle activation contributes to the stance motion.

In this research, we adopted a musculoskeletal model incorporating 70 muscles and human anatomical data. We proposed a neural controller (Fig. 1) to maintain it standing under 140 ms delay. Through the forward dynamics simulation, we validated whether the proposed controller could keep musculoskeletal model standing. Furthermore, we muscle activations were investigated to validate whether our controller could simulate physiologically plausible activations.

Keywords: Postural control, Musculoskeletal model, biological simulation

References

[1] Jiang,P., Chiba,R., Takakusaki,K., & Ota,J. Generation of biped stance motion in consideration of neurological time delay through forward dynamics simulation. Proc. IEEE Int. MHS2015, pp. 205-208, 2015

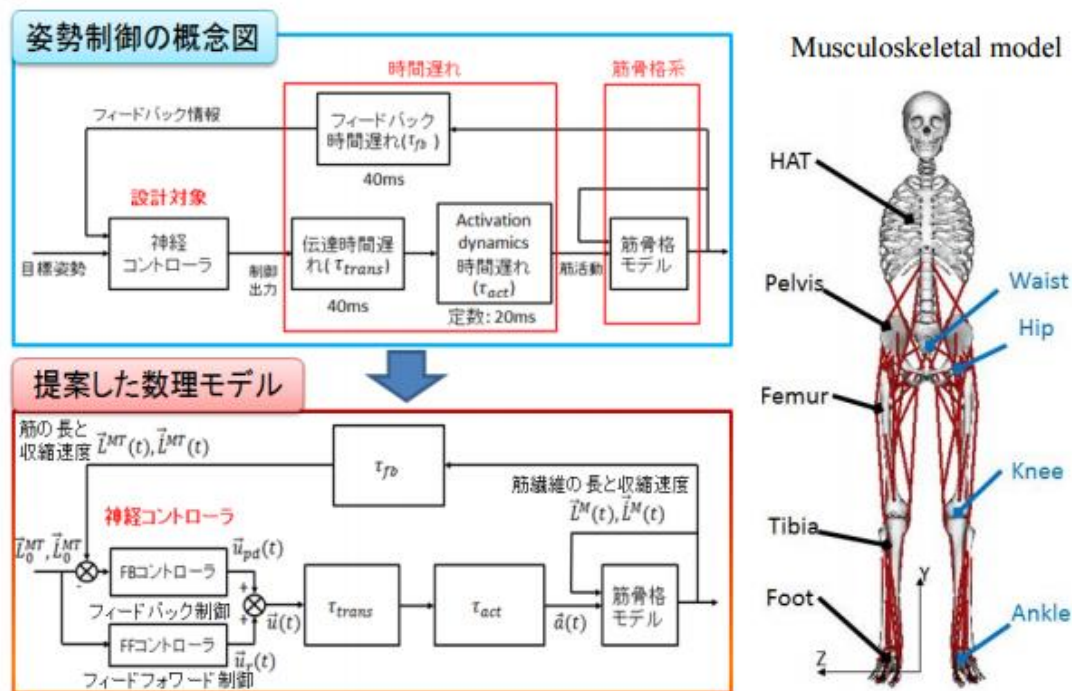


Fig. 1 Stance postural control model and musculoskeletal model