

ASSIGNMENT 3 — MUSCLE MODELLING

For all questions below, provide all programming code and plots in the report.

1. Plot the following (should look the same as the slides in class). 7 marks
 - a. Active Force Length Curve. 1 mark
 - b. Passive Force Length Curve. 1 mark
 - c. Velocity (x-axis)-Force Curve. 1 mark
 - d. Force (x-axis)-Velocity Curve. 1 mark
 - e. Tendon Strain-Force Relationship. 1 mark
 - f. Tendon Compliance. 1 mark
 - g. Activation Dynamics. 1 mark
 - h. Note: You can also refer to Thelen (2003) for the equations, albeit with a slight change in some of the notation
2. Program the Hill-Model presented in Class. 10 marks
 - a. Replicate the slide (10): Hill Models | Max Stim. Use the same initial conditions as listed on the slide. Plot STIM, γ , Tendon Force, Muscle Fiber Length, and Tendon Length. 10 marks
 - b. Use any integration scheme you prefer, but you may have to go quite small with Euler (e.g., 0.00001 s)
3. Use the given DMA model code by Zahalak (1981) (**Graduates Only**). 6 marks
 - a. Replicate the slide (29): Zahalak (1981) | Constant Velocity; using the same initial conditions as listed on the slide. 2 marks
 - b. Also plot normalized Q_0 , Q_2 in addition to Q_1 . 1 mark
 - c. Replicate the slide (31): Zahalak (1981) | Oscillating Muscle; using the same initial conditions as listed on the slide. 2 marks
 - d. Also plot normalized Q_0 , Q_2 in addition to Q_1 . 1 mark