For each IC muscle

1) Obtain 3D coordinates (x,y,z) of the ends of each of *n* fascicles, where each fascicle begins at the origin (i.e. center of intercheliceral sclerite).

2) Calculate the physical length of each fascicle vector: FL = (x2 + v2 + z2)0.5

3) Calculate unitized x (Ux) and unitized y (Uy):

Uy = x/FL Uz=y/FL

Explanation: FL is proportional to the contraction velocity of the fascicle but all fascicles have a magnitude of unit length (1) regardless of physical length. Thus, FL, x, y, z must all by divided by FL to create a unitized vector with the same angle as the original vector but with a magnitude of 1. The unit vector is then projected onto the midsagittal (yz) plane. This removes the transverse (x) magnitude, which reflects the action of a bilaterally symmetrical muscle on the ICS. This value will always be lower than 1 unless the fascicle is located in the midsagittal plane.

4) Sum Uy for all fascicles. This is the relative longitudinal magnitude of the muscle. RLM

5) Sum Uz for all fascicles. This is the relative vertical magnitude of the muscle. RVM

6) Calculate the relative effective magnitude of the muscle: REM = (RLM2 + RVM2)0.5

7) Calculate the angle of REF: AMUS = ACOS (RLM/REM)

8) Calculate the longitudinal effective force (CPFY); CPFY = Polygon Area/Fiber No. \* RLM

Calculate the vertical effective force (CPFZ): CPFZ = Polygon Area/Fiber No. \* RVM

Calculate the total effective force (FMUS): FMUS = Polygon Area/Fiber No. \* REF

9) Size-corrected forces: SZ.FMUS = FMUS/Carapace width^2, etc.