

Supplementary Materials

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Complete results for the muscles studied are given in
this supplementary materials.

Muscles	Origin & Insertion points (cm)	Via points (cm)	R RMS error (cm, %)	L rRMS error (%)	L correlation
<i>Type 1 muscles</i>					
ANC	31.03 -0.05 -1.49 (Hu) 0.08 -0.19 -2.12 (U)	31.07 0.19 -1.72 (Hu) 0.07 -0.08 -2.05 (U)	EFE: 0.07 (6.59)	0.43	0.9999
BRA	20.94 0.52 0.47 (Hu) 2.37 -0.17 0.07 (U)	29.25 1.29 -0.25(Hu) 1.75 -0.51 1.62 (U)	EFE: 0.14 (8.67)	0.29	0.9994
PQ	22.12 -0.12 0.59 (U) 22.14 1.24 1.54 (R)	22.12 0.22 0.63 (U) 22.12 1.37 1.38 (R)	PS: 0.00 (0.13)	0.00	1
SUP	3.36 -1.90 -1.34 (U) 6.85 1.99 1.43 (R)	5.13 -1.88 -0.88 (U) 5.21 0.53 -0.79(R)	PS: 0.05 (7.10)	0.19	0.9997
TRImed	16.66 0.86 -1.04 (Hu) -1.03 0.03 -2.10 (U)	29.50 0.87 -2.88 (Hu) -0.47 -0.33 -2.35 (U)	PS: 0.24 (11.05)	0.40	0.9996
TRIlat	15.38 -0.24 -0.75 (Hu) -1.05 0.03 -2.10 (U)	30.76 1.31 -2.55 (Hu) -0.58 -0.42 -2.42 (U)	EFE: 0.14 (6.46)	0.13	0.9998

Table 1. Muscle path, error between input moment arm and model moment arm and between input length and model length after optimization for a 170cm man tall. (Hu) stands for humerus frame, (R) radius frame, (U) ulna frame, (Ha) hand frame. Frames are defined in Pennestrì, E., Stefanelli, R., Valentini, P. P., and Vita, L., 2007. Virtual musculo-skeletal model for the biomechanical analysis of the upper limb. Journal of Biomechanics

Muscles	Origin & Insertion points (cm)	Via points (cm)	R RMS error (cm, %)	L rRMS error (%)	<i>L</i> correlation
<i>Type 2 muscles</i>					
BRD	21.75 -1.32 -0.88 (Hu) 20.28 -0.12 3.47 (R)	21.78 -3.89 -0.78 (Hu) 10.47 0.51 2.26 (R)	EEF: 0.27 (5.17) PS: 0.07 (13.08)	0.20	0.9998
ECRL	29.07 -0.87 0.11 (Hu) 2.47 -1.09 0.69 (Ha)	30.57 -0.88 1.95 (Hu) 2.32 0.51 0.34 (R) 21.22 -2.01 -1.15 (R) 1.65 -1.81 -2.31 (Ha)	EEF: 0.66 (34.80) PS: 0.11 (57.25) WDV: 0.55 (29.23) WFE: 0.30 (14.43)	0.60	0.9902
ECRB	31.85 3.92 0.57 (Hu) 2.05 -1.33 -2.62 (Ha)	31.85 3.92 0.57 (Hu) 12.68 2.22 -0.39 (R) 11.53 -0.54 -2.25 (R) 2.05 -1.33 -2.62 (Ha)	EEF: 0.02 (6.36) PS: 0.03 (19.22) WDV: 0.22 (20.85) WFE: 0.49 (18.70)	11.18	0.9964
ECU	31.62 -3.90 -0.73 (Hu) 0.00 2.76 -0.81 (Ha)	31.62 -3.90 -0.73 (Hu) 24.79 0.58 0.17(R) 22.92 2.32 -0.13 (R) 0.00 2.76 -0.81 (Ha)	EEF: 0.17 (30.91) PS: 0.03 (24.77) WDV: 0.29 (13.49) WFE: 0.45 (44.67)	1.73	0.8435
FCR	30.28 3.45 0.71 (Hu) 2.51 0.13 1.49 (Ha)	30.38 2.19 0.59 (Hu) 8.23 2.20 0.74 (R) 22.83 -1.23 1.96 (R) 0.00 -0.91 2.79 (Ha)	EEF: 0.07 (6.52) PS: 0.01 (4.25) WDV: 0.32 (38.36) WFE: 0.58 (21.12)	0.66	0.9980
FCU	30.22 3.17 0.22 (Hu) 1.93 0.96 0.02 (Ha)	30.24 2.41 0.23 (Hu) 6.35 1.58 0.26 (R) 21.33 1.49 1.78 (R) 0.98 1.67 2.41(Ha)	EEF: 0.12 (11.99) PS: 0.02 (8.97) WDV: 0.68 (35.91) WFE: 0.75 (26.01)	1.09	0.9928
PL	29.95 4.16 0.51 (Hu) 1.83 -0.40 1.84(Ha)	29.99 2.48 0.24 (Hu) 7.61 2.18 0.78 (R) 24.82 -0.59 2.24 (R) 1.83 -0.40 1.84 (Ha)	EEF: 0.04 (2.86) PS: 0.02 (5.20) WDV: 0.39 (41.95) WFE: 1.94 (51.75)	2.93	0.9650
PT	30.05 3.47 0.34 (Hu) 12.54 -0.09 2.41 (R)	30.15 3.94 0.37 (Hu) 9.15 1.39 1.85 (R)	EEF: 0.14 (12.15) PS: 0.08 (8.79)	0.25	0.9991

Table 2. Muscle path, error between input moment arm and model moment arm and between input length and model length after optimization for a 170cm man tall. (Hu) stands for humerus frame, (R) radius frame, (U) ulna frame, (Ha) hand frame. Frames are defined in Pennestrì, E., Stefanelli, R., Valentini, P. P., and Vita, L., 2007. Virtual musculo-skeletal model for the biomechanical analysis of the upper limb. Journal of Biomechanics

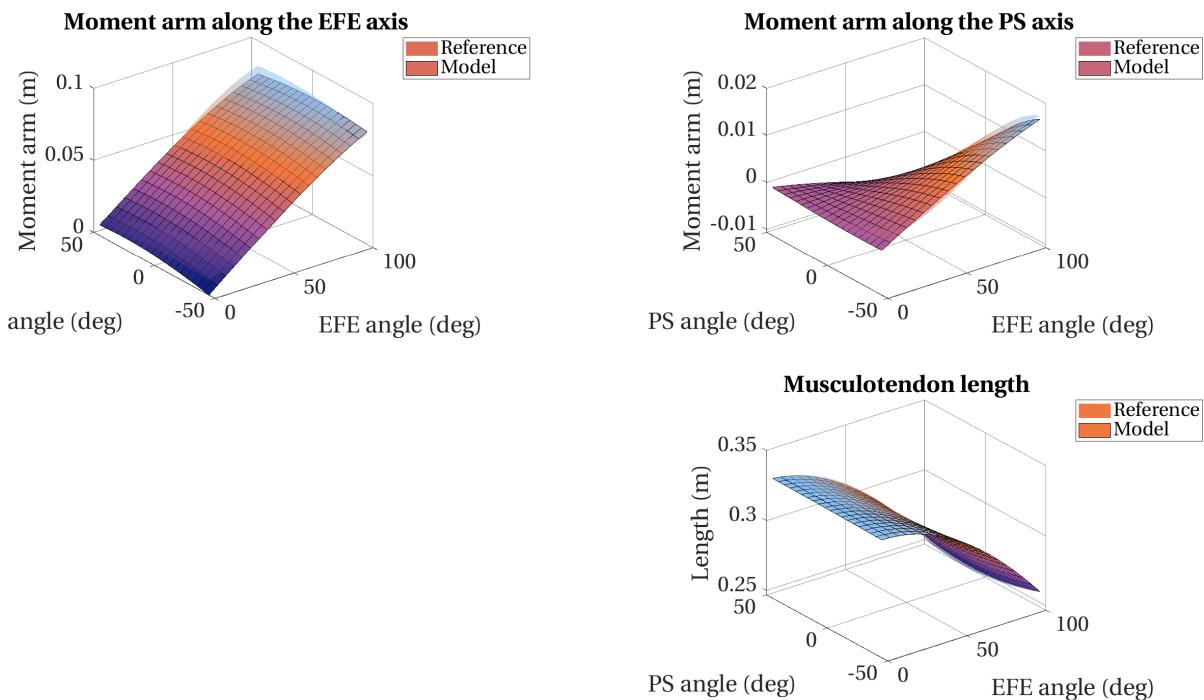


Figure 1. Results for the Brachioradialis muscle

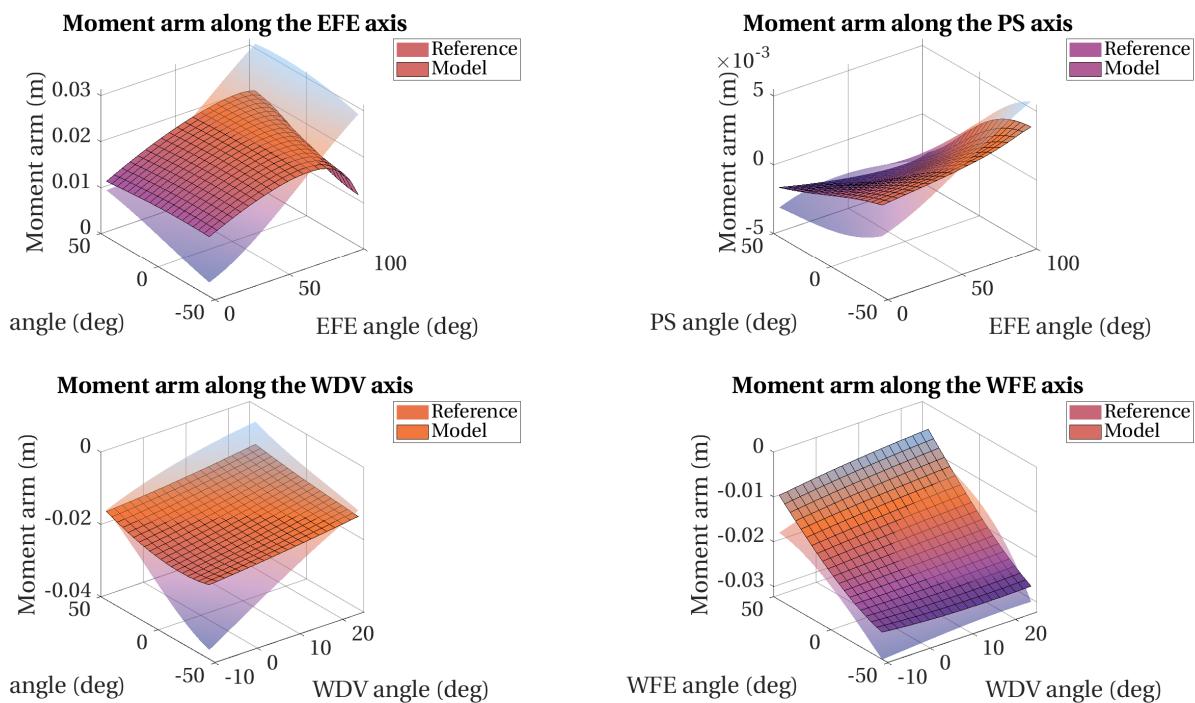


Figure 2. Results for the Extensor Carpi Radialis Longus muscle

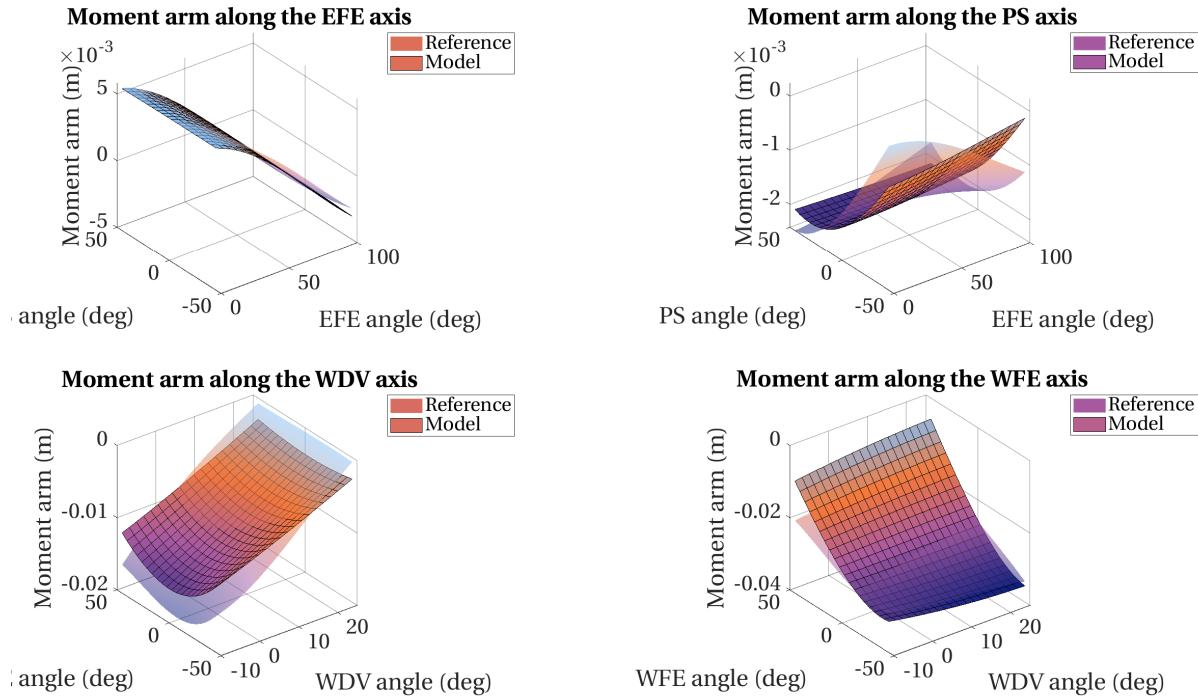


Figure 3. Results for the Extensor Carpi Radialis Brevis muscle

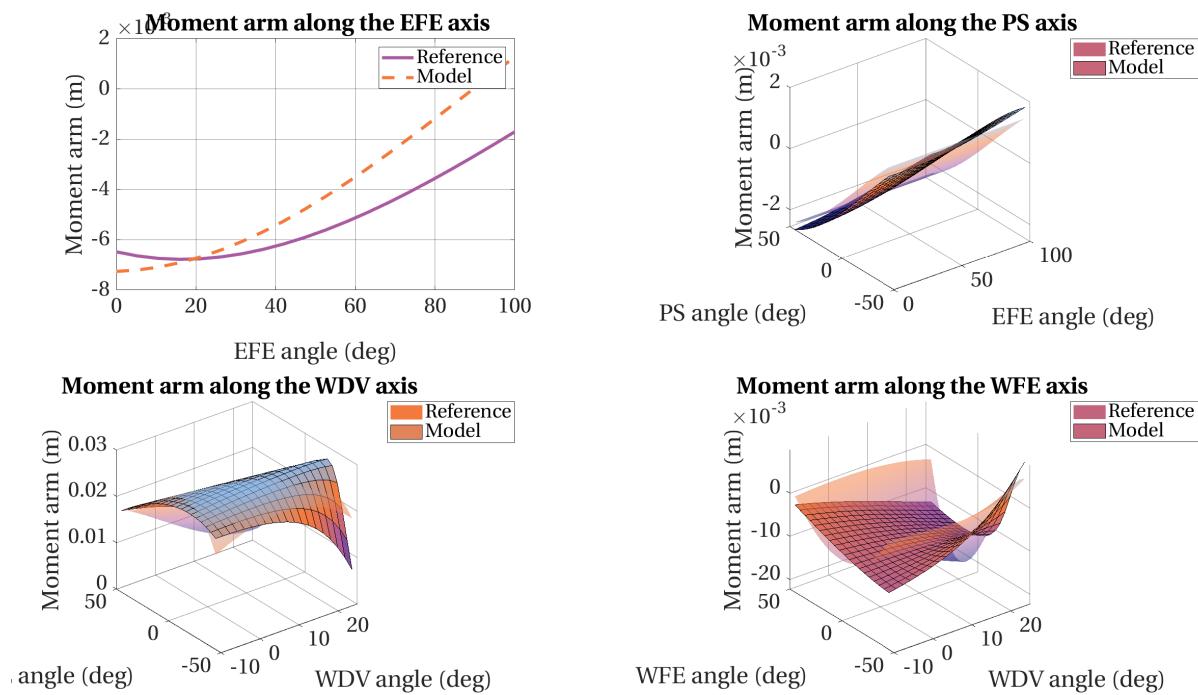


Figure 4. Results for the Extensor Carpi Ulnaris muscle

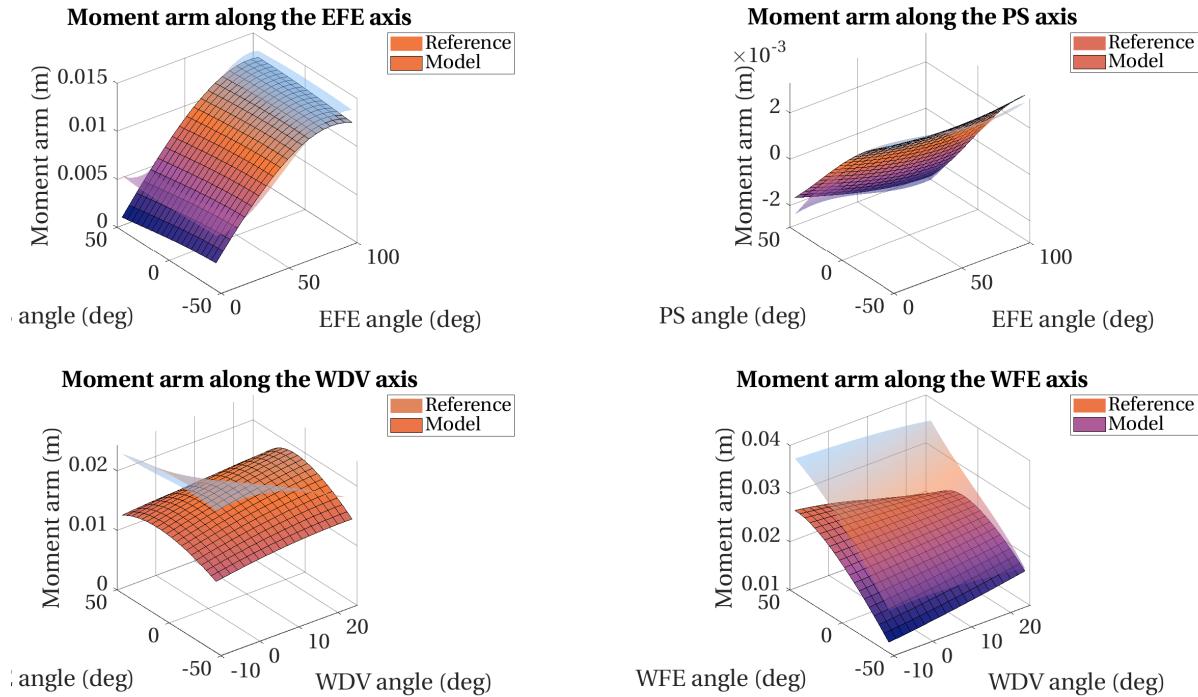


Figure 5. Results for the Flexor Carpi Ulnaris muscle

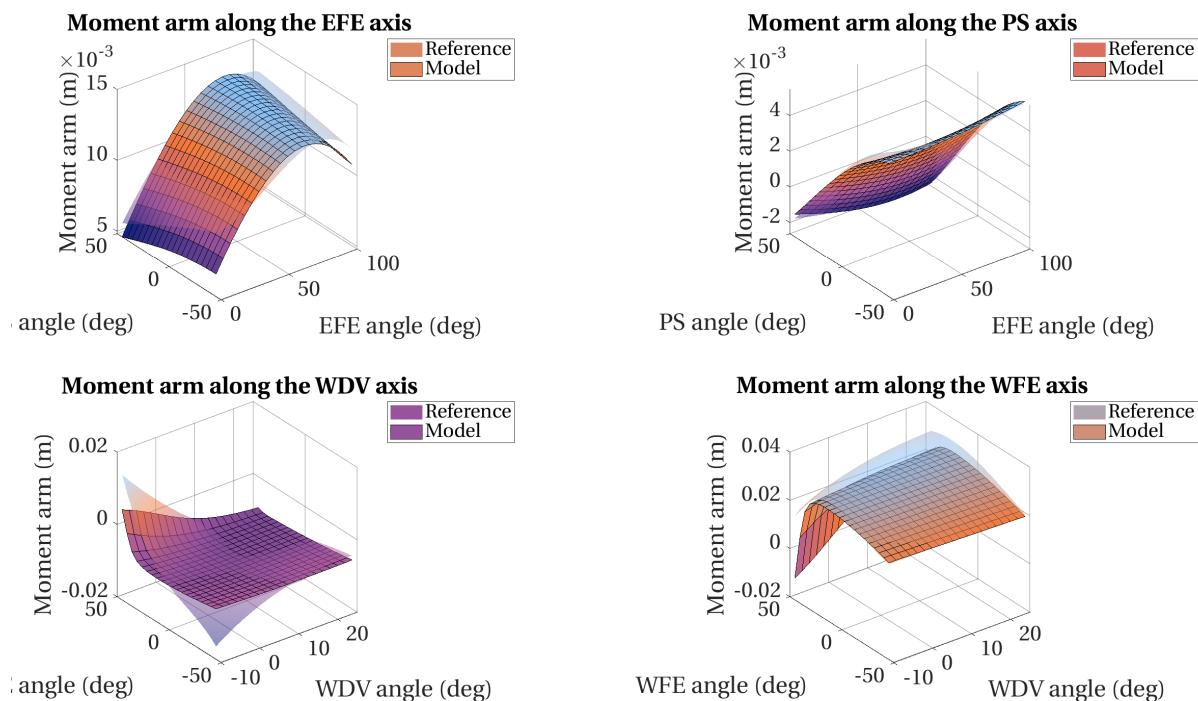


Figure 6. Results for the Flexor Carpi Radialis muscle

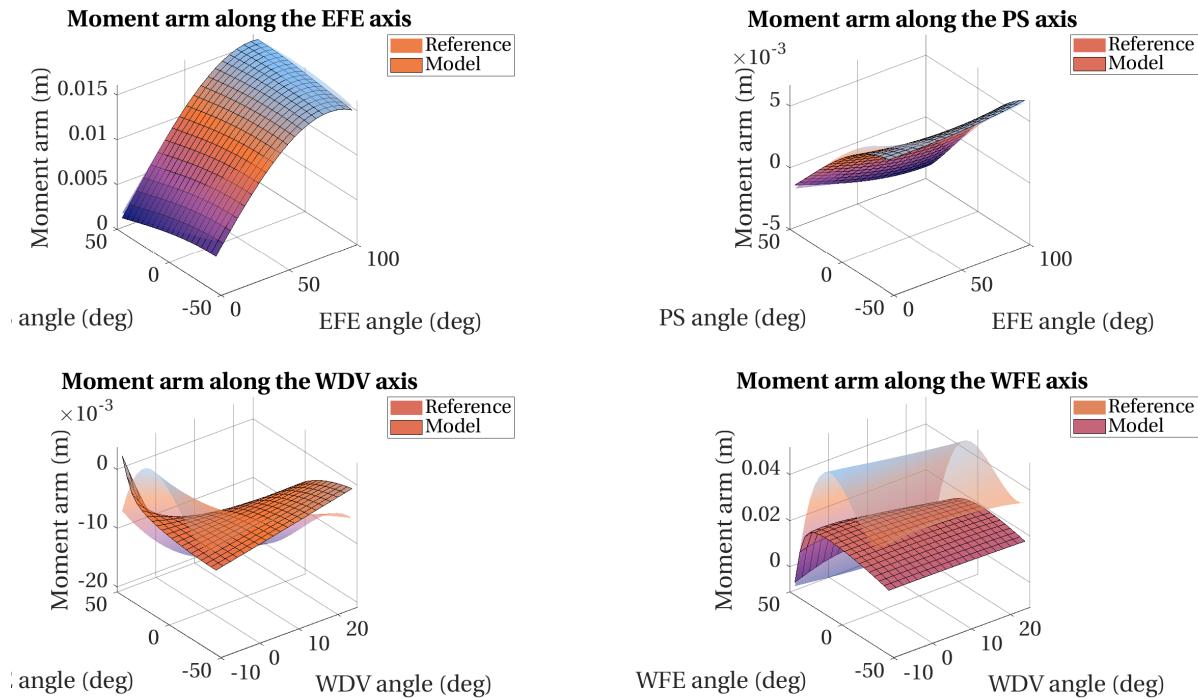


Figure 7. Results for the Palmaris Longus muscle

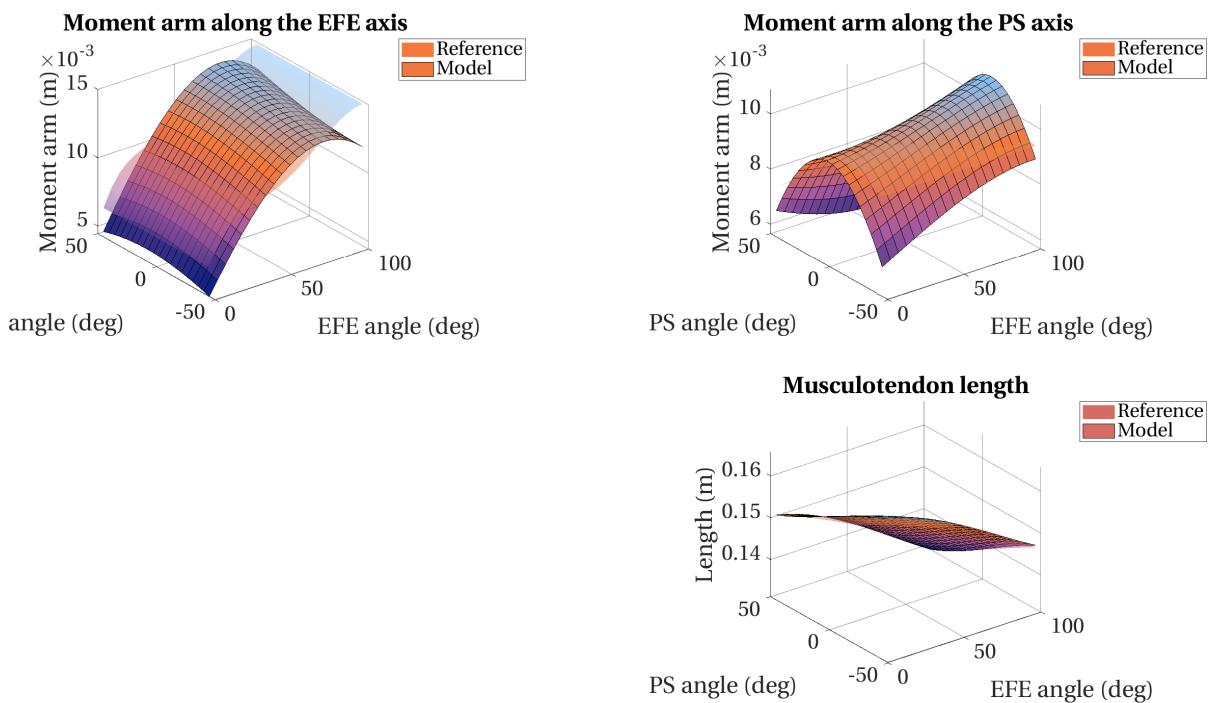


Figure 8. Results for the Pronator Teres muscle

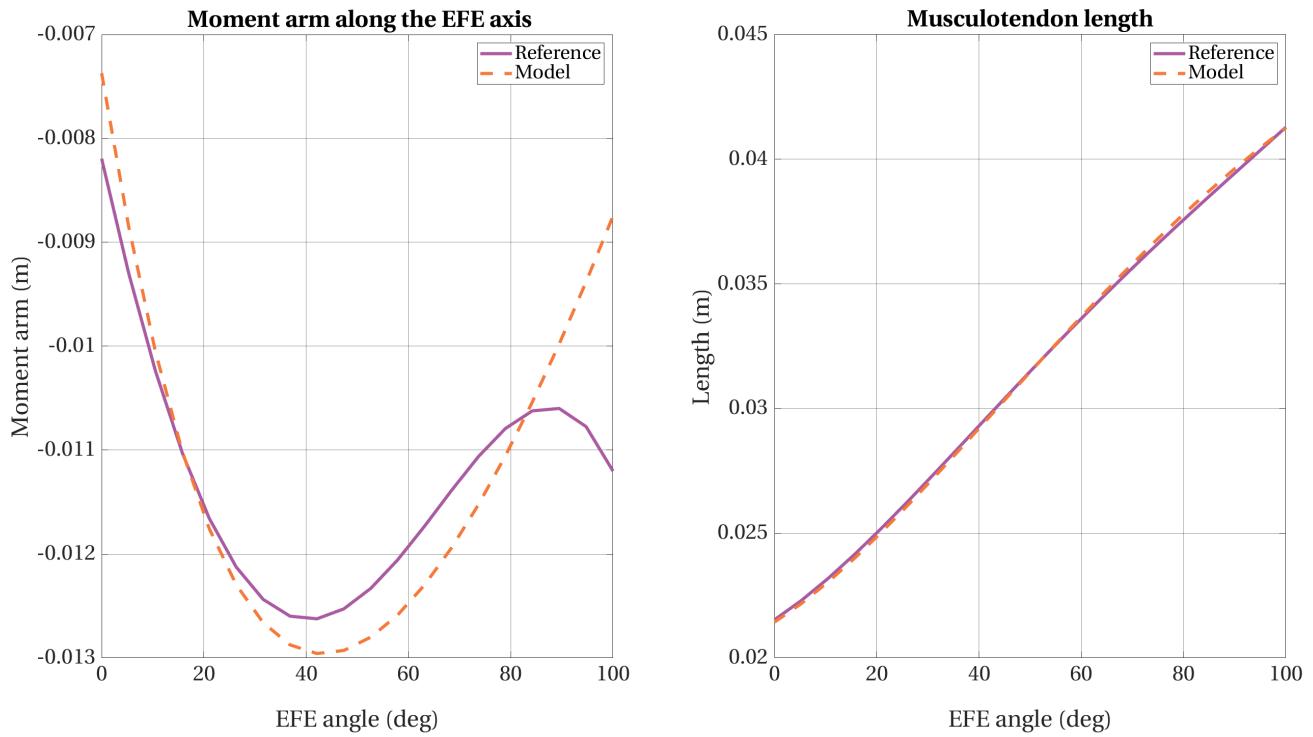


Figure 9. Results for the Anconeus muscle

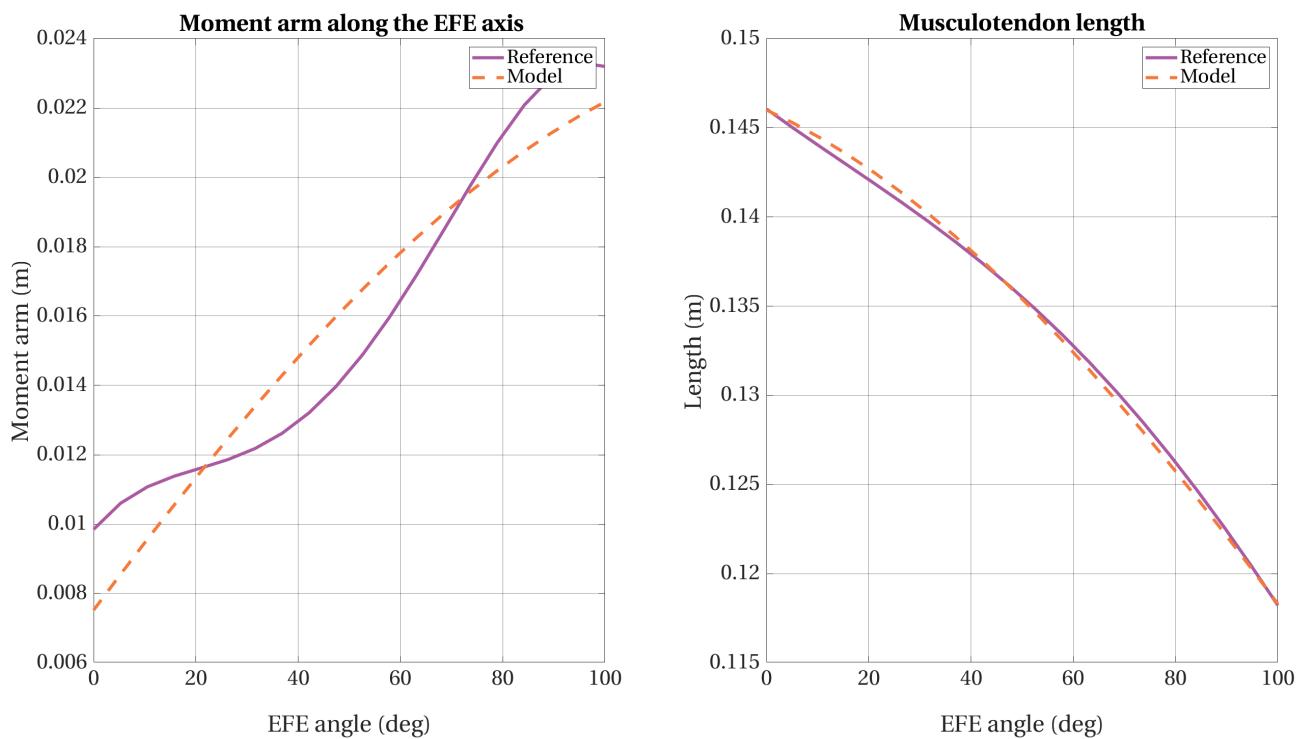


Figure 10. Results for the Brachialis muscle

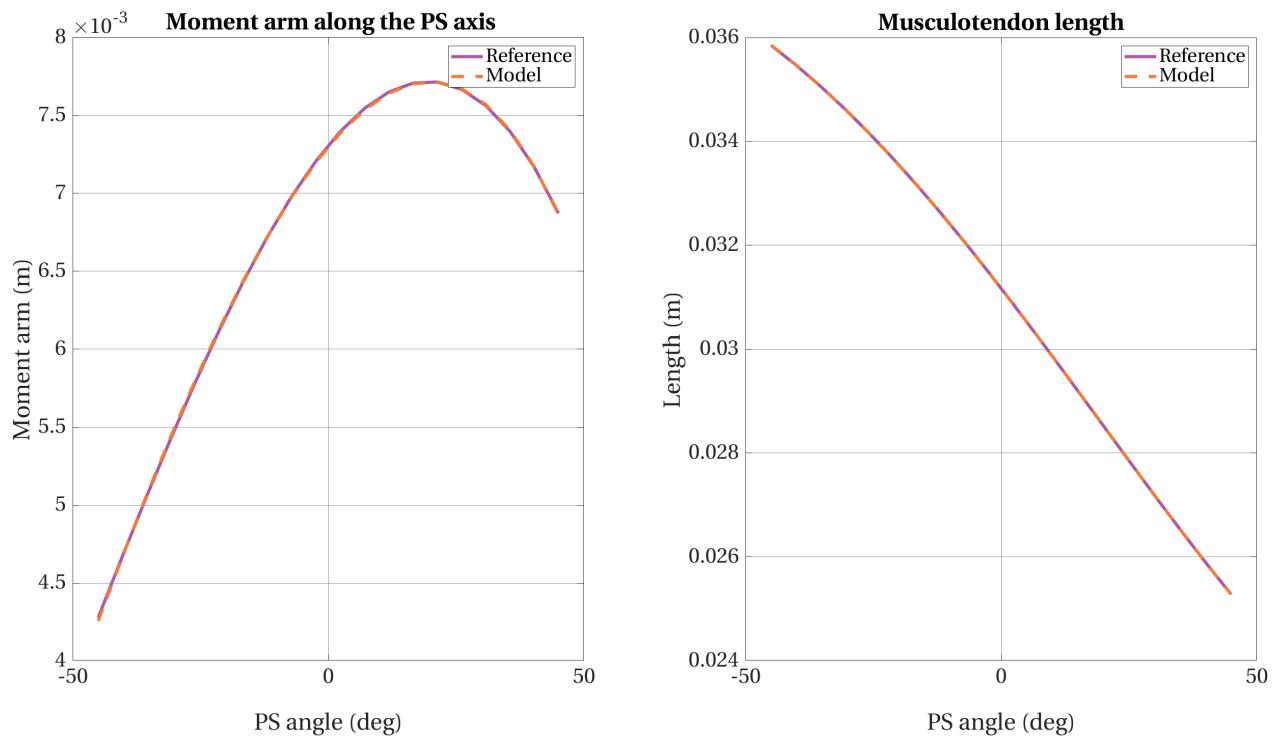


Figure 11. Results for the Pronator Quadratus muscle

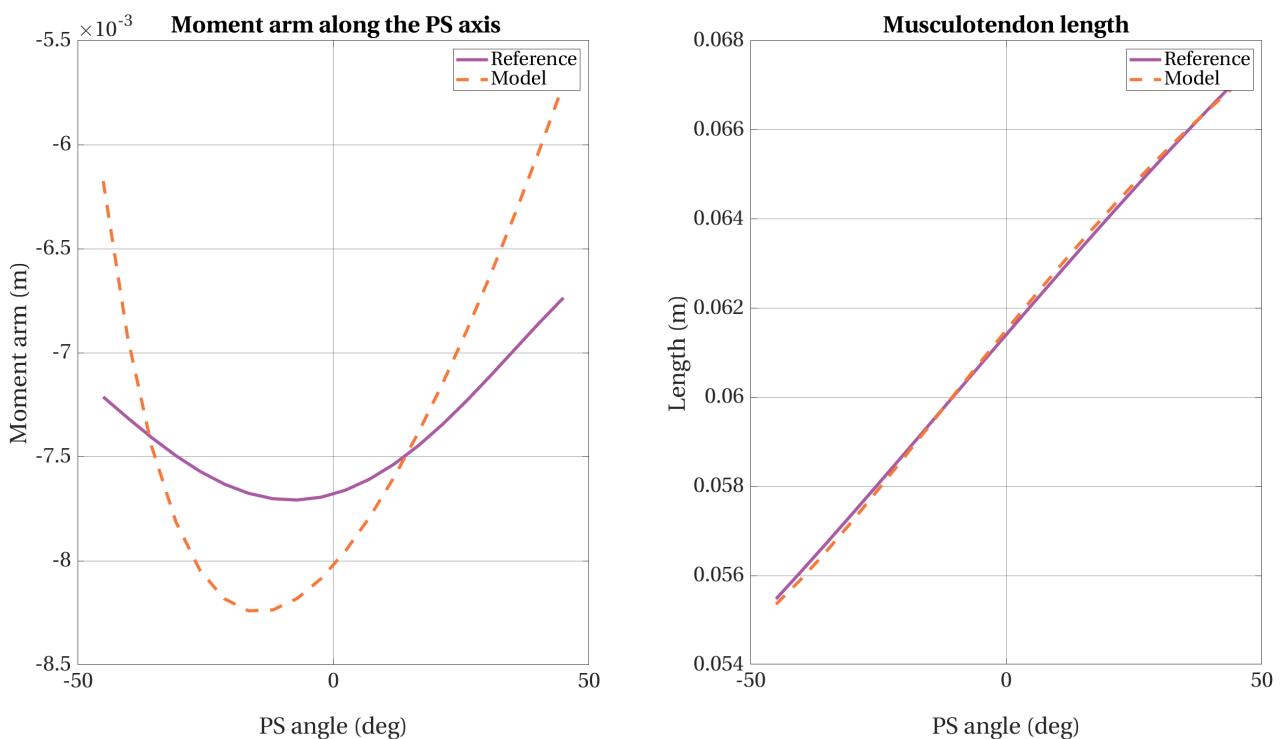


Figure 12. Results for the Supinator Brevis muscle

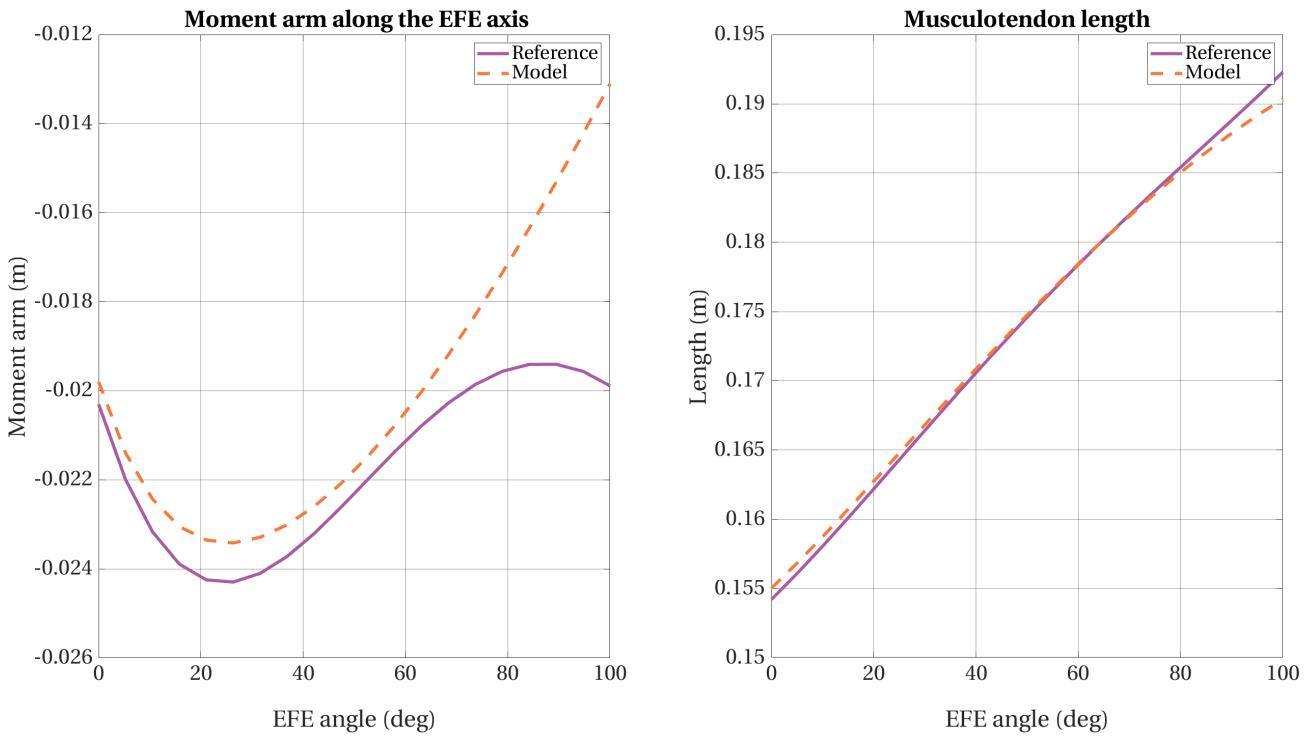


Figure 13. Results for the Triceps Medial muscle

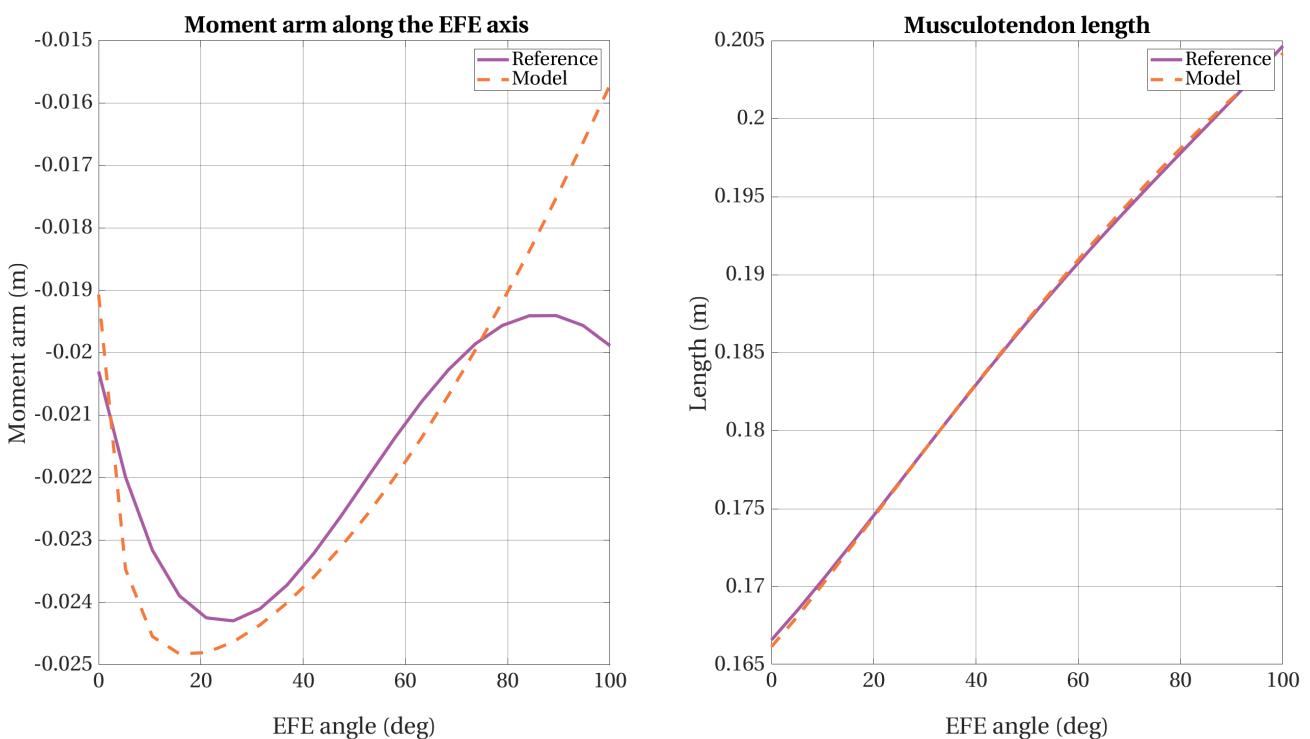


Figure 14. Results for the Triceps Lateral muscle