Short communication

The Biomechanical Model of the Long Finger Extensor Mechanism and its Parametric Identification

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Abstract – The extensor mechanism of the finger is a structure transmitting the forces from several muscles to the finger joints. Force transmission in the extensor mechanism is usually modeled by equations with constant coefficients which are determined experimentally only for finger extension posture. However, the coefficient values change with finger flexion because of the extensor mechanism deformation. This induces inaccurate results for any other finger postures. We proposed a biomechanical model of the extensor mechanism represented as elastic strings. The model includes the main tendons and ligaments. The parametric identification of the model in extension posture was performed to match the distribution of the forces among the tendons to experimental data. The parametrized model was used to simulate three degrees of flexion. Furthermore, the ability of the model to reproduce how the force distribution in simulated extensor mechanism changes according to the muscle forces was also demonstrated. The proposed model could be used to simulate the extensor mechanism for any physiological finger posture for which the coefficients involved in the equations are unknown.

Keywords – biomechanical modelling, finger modelling, extensor mechanism, tendons

INTRODUCTION