TOWARDS A DYNAMICAL MODEL OF SKELETAL MUSCLE

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An equation of motion for skeletal muscle is derived, one part of which is fixed, while the other is free. To the latter, active and passive external forces are applied. The obtained nonlinear inhomogeneous differential second-order equation for the muscle length change in time is analytically solved. It is shown that, depending on the parameter values of this equation, the skeletal muscle contraction can have both single and periodic (vibrational) behavior. It is proved that the isotonic muscle contraction begins at the moment, when the strain value of the stressed muscle equals the value of the stress. The limited stress value of the beginning of isotonic muscle contraction and the maximum possible muscular strain are found. In spite of the quantitative differences between theoretical and experimental results, one should notice their qualitative agreement within the framework of the presented model.