# INFLUENCE OF ELASTIC CHARACTERISTICS OF SUPPORT ON THE WAVE PROCESS OF ENERGY TRANSFER FROM ONE LINK OF THE ATHLETE'S BODY TO ANOTHER

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**INTRODUCTION:** The established fact of energy transmission from one link of the athlete's body to another during movement [3, 4] has never been connected with the processes of its interaction with supports differing in their resilient characteristics. The aim of this work is to establish the above-mentioned connection using a theory we have developed of wave processes of energy transmission in the athlete's movements [1, 2].

**METHODS:** We use a multi-link model. Two links of the model are conjugated by a joint and connected by a non-linear element simulating muscle. The non-linear element contains a contractile element (CE), a consecutive elastic component (coefficient of elasticity C1), a parallel elastic component (coefficient of elasticity C2) and a damping element. Strength manifested by the contractile component of the muscle is described as a Hausse impulse: $f = F_{\max} \exp\left\{-(t-t_0)^2 / 2b^2\right\}$, where $F_{max}$ = maximal strength of ÑÝ, $t_0$ = moment in time corresponding to $F_{max}$, *2b* = full pulse duration. The lower end of one link touches the elastic support with the coefficient of elasticity $C_0$. The quantity of energy brought into the system 'two links - non-linear element' was examined, as well as the quantity of energy transferred to the following links.

**RESULTS AND DISCUSSION:** The quantity of energy transferred to the following links can be described in general as:

$$E = \frac{F_{\max}}{C_0} \Phi_1(C_1, C_2, \omega) + \Phi_2(\omega^2, F_{\max}, b^2, t_0)$$

where $\omega$ = the difference in angular velocities of the movements of the two links. An increase in $C_0$ leads to a decrease in *E*. If $C_0 \to \infty$, then $E \to \Phi_2$. In this case the link is jammed in a solid support and the energy is transmitted from the first link to the second one only due to the active muscular strength of (ÑE). A decrease in $C_0$ leads to an increase in the quantity of energy transmitted to the following links. Structures of ÑE and musculotendinous structures, which from the point of view of mechanics are described integrally by the coefficients $C_1$ and $C_2$, work during the interaction with the resilient support. At the same time, the interaction of a link with a solid support primarily trains the contractile component, so the muscular structures responsible for active muscular effort are trained.

**CONCLUSIONS:** The interaction of a body link with supports of different resilience provides the development of different components of muscular structures and the improvement of different mechanisms of strength and energetic supply of movement. So a program for training athletes must use supports with adjustable elastic characteristics. Our experiments with top-class athletes have shown that the necessary conditions can be efficiently created by the use of pneumocovers, as their resiliency is easily adjustable in a wide range of coefficients of elasticity.

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