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THE BIOMECHANICAL ANALYSIS OF CANOE ROWING TECHNIQUE BASED ON WIRELESS STRAIN MEASUREMENT

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Nowadays, in the field of biomechanical analysis of canoe rowing techniques, questions of accuracy and validity of measurements remain unresolved, which requires additional efforts in developing methods for recording parameters of athletes ' movements when interacting with objects of the external environment [1].

To solve the current problem, we have carried out work, the main purpose of which was to determine the most suitable place for placing strain elements on the oar shaft by performing a number of engineering calculations using the laws of theoretical mechanics. Because the process of rowing in vivo being distributed by the paddle tension is extremely time-consuming due to the differential nature of the effort, we decided to perform the calculation in the conditions, modeling efforts at the time the normal location of the paddle to the water surface. Based on the results of calculations with acceptable simplifications of the analyzed object, we found that the most favorable location of the strain element in terms of completeness and quality of the recorded data is in the area near the pulling arm of the rower, and closer to the pushing arm. For the vast majority of oars, the most advantageous location of the strain gauge element is at a distance of 2/3 of the length of the segment from the handle to the center of the grip of the pulling hand of the athlete.

In addition, we have developed a mathematical calculation of the components of the resulting force applied to the oar during rowing by the athlete (F_{lh} – the force created by the pulling arm of the athlete; F_{uh1} – the horizontal component of the force created by the pushing arm of the athlete) and the control environment (R_W – the reaction force of the environment). The resulting force is registered using a wireless strain gauge under natural rowing conditions. According to the developed calculation, we determined the relative ratio of the resulting force impact on the paddle: R_W = 27.3 %; F_{lh} = 50.1 %; F_{uh1} = 22.6 %.

References

1. Smart Oar Blade for Hydrodynamic Analysis of Rowing. Fuss F.K., Weizman Y., Fundel S., Smith R.M. Procedia Engineering, vol. 147, 2016, p. 735–740.