

## STUDY THE RELATIONSHIP BETWEEN BIOMECHANICAL PARAMETERS ROWING

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The quality of the training process and, consequently, athletic performance depends largely on the latitude of the received information of different nature: pedagogical, biomedical, kinematic, biodynamic, etc. Of particular interest are indicators of labor activity of sportsmen (speed, pace, power, etc.) during the passage of both the race and its segments. Changing these parameters on the course is the result obtained on the body burden, as they appear due to changes in both indicators of cardiovascular system and muscle activity of the system.

Through video analysis rowing at a distance of 1000 meters, one of the basic indicators of rowing were investigated, influencing the competitive outcome, namely, speed, pace, power, the total time of the stroke, the time reference and unsupported phase, rental length, rolled length of the support and unsupported phase.

Rental length is one of the main parameters that characterize the distance traveled by the boat in one stroke. Over a distance of this parameter varies slightly and scope of change of 3.3% from the average value in the distance, indicating some stability of this index (Figure 1).

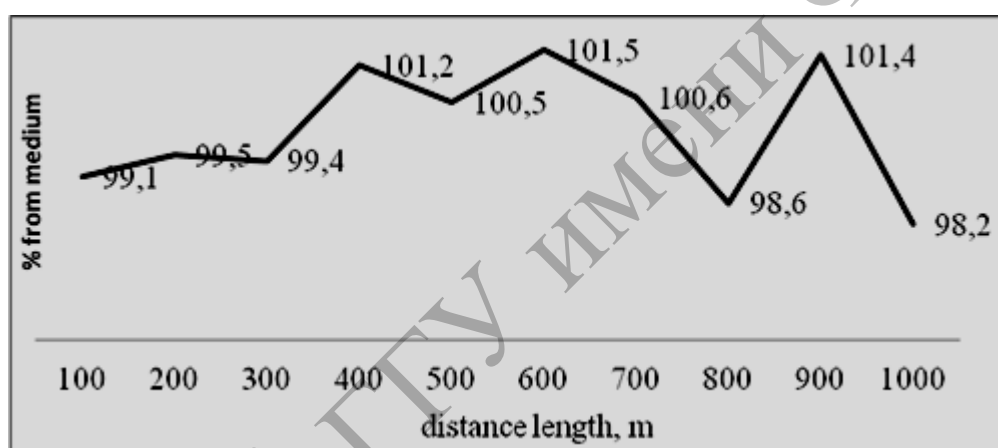
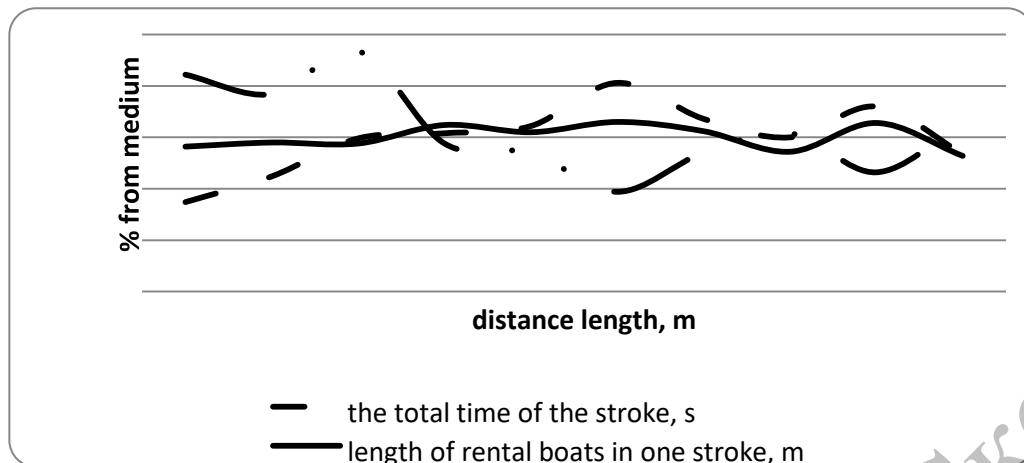


Figure 1 – Change the length of the boat rental at a fungus at a distance of 1000 meters

In our opinion, this stability is achieved due to the fact that the boat rolled length depends on the capacity and the stroke rate, i. e., increasing the power and should cause an increase in rental length by increasing the boat speed. But the increase in power and is increasing the pace, leading to a decrease in the time of the stroke, resulting in rental length changes slightly. When reducing the power goes down the tempo, time increases stroke, decreases the speed and as a result of significant changes in the length of the rental boat does not occur. From the above it can be concluded that most power increase leads to a decrease in the length of rental boats, and reduction rate increases the time and the stroke length of the boat for one rolling stroke, and vice versa (see Figure 2).



**Figure 2 – Change the length of the boat rental at a stroke, the total time of the stroke, and the tempo at a distance of 1000 meters**

Length of rental boats for the reference phase is characterized, above all, the effectiveness of the implementation of the stroke, which depends on the effort expended and developed at the same rate and varies significantly more than the length of the boat rental at a stroke. Its scope is 10.4% of the average in the distance. These fluctuations depend on the change of power and pace at a distance, and from changes in the contribution of the support or unsupported phases rental length in the overall length of the rental.

The highest values of the length of the boat rental for a phase reference are observed in the first half of the race, where its value is above average. In our opinion, this is due to the fact that these segments of large power values. But the passage of the first half of the race it was still at the expense of more effective implementation of the stroke, and in the second half of the race due to fatigue of the developing efficiency of the implementation of the reduced stroke, which proves a decrease in the average values of the length of the boat rental for a phase reference in the second half of the race.

Boat rental length of the unsupported phase is also important, since it is characterized by the unsupported position oars, where the amount of energy spent rower, much less than in the reference phase. So, the greater the distance the boat will take place during this period of time, the less effort rower costs in subsequent work. Length of rental boats for the unsupported phase depends primarily on the performance of the stroke in the support phase, where necessary, and is attached to the boat speed that is lost in the unsupported position. rolling phase unsupported length also depends on the time that is given to this phase: the greater the time and speed, the greater the distance traveled. But the increase in time unsupported phase will certainly lead to the reduction of the speed, so as soon as it goes into decline during this period. That is, on the one hand, increasing the length of the boat rolled unsupported phase results in a more economical power consumption, and the other leads to a decrease in speed. Therefore, the optimal length of hire boats for the unsupported phase must be how best to use the reference phase can be, where the boat is given to the required speed for the unsupported phase. It is also necessary to find the best combination of support and unsupported stroke phase in time that will reduce the amount spent force and would not lead to a significant drop in speed.

The rate of decline is the increase in the total time of the stroke, but because of the power reduction decreases the phase reference time, these two factors cause a significant increase in the time phase unsupported by 6.5%. Also, changes occur in the length of rental boats. Where the length of the boat rental at a stroke increased by 1.8% on average, but when you consider that the scope of changes in rental boats for the entire distance of only 3.3%, the rent increases by 55% from its scope, that is, there is a significant increase. Such an increase in the length of rental boats should lead to an increase in both the reference and phase reference-free, but the power drop causes a decrease in the length of the rental for a phase reference. Here, similar changes occur as with the total time of the stroke - increases the overall length of rental at a stroke and decreases the length of rental for the support phase, which leads to a significant increase in the length of rental boats for the unsupported phase by 7.4% from the average.

On the interval 300–400 meters there is an increase rate of 0.8% with capacity falling by 3.5% and the rate of 1% from the mean value at a distance, primarily due to increased rental boats at a stroke. And this is due to an increase in rental for unsupported phase. Since the dome is a short phase, it is necessary to make the best use for recreation. It is important to maintain health at a distance rower has his ability to alternate in each cycle stroke muscle tension during the relaxation phase reference to them in the unsupported phase. Increased leisure time (in this case, an increase in time unsupported stroke phase occurs at 6.5% of the average) leads to the later

fatigue. To wit, in the interval of 300–400 meters there is a reduction of pace and power, and this increases the speed and rest time. In our opinion, this is for two reasons. The first - the decline of power and reduce the time of the stroke reference phase should lead to a significant drop in rental and boat length in this phase, but we have it decreased only by 3.5%, indicating a more rational use of the reference phase of the stroke in technical terms. The second - a significant increase in the time, and hence the length of rental unsupported phase was due, along with the fall of the power and pace of lead and speed fall, and we have the speed of at least slightly, but increases then we can say that there is a better balance of the different parameters of the stroke: length of time and rolling bearing and unsupported phase power and rate.

In the interval 700–800 meters, and there is an increase rate of power and speed decreases. By increasing the rate of decreasing the total time of the stroke, but because of the power increase is an increase in the phase reference time, these two changes lead to a significant reduction in the time of the stroke phase unsupported by 8.1%. The increase in power causes an increase in the reference phase of the boat rolled the length of the stroke, and the rate of increase due to the overall reduction of the time of the stroke, resulting in a decrease in the overall length of the boat rental at a stroke by 2%. Reducing the overall length of rental and an increase in rental reference phase leads to a significant drop in the boat rental for unsupported length of the phase of stroke by 7.8%.

On the interval 700–800 meters with a capacity increase of 5.8%, the rate of 2.9%, the speed drop occurs by 0.2% due to the decrease in rental length is 2%. Reducing the length of the boat rolling occurs due to the fact that an increase in the stroke reference phase along with increase in capacity does not increase due speed. To wit, speed fall in the interval 700–800 meters by increasing the power and pace is due to irrational use of the reference phase of the stroke, which is probably due to the developing fatigue.

It was revealed that in the interval of 300–400 meters, in contrast to the segment 700–800 meters there is a power loss of 1.6%, the rate of 1%, with an increase rate of 2.1%, reflecting the reduction of effort in improving the transit time segments. In our opinion this is due to better use of the reference phase of the stroke, in which, despite the drop in the power and pace, rental length is increased by 3.4%, with an increase in its time by 1%.

The efficiency of the reference phase of the stroke in the interval 300–400 meters is much larger than the interval of 700–800 meters, that is convergent with our views on a more productive use of the reference phase of the stroke at 300–400 meters than the 700–800 meters.