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LETTER TO THE EDITOR

Modeling and Analysis of the Influence of Canoe Hydrodynamic Force on Lake Ecological Environment

Xin Fan*
College of Physical Education, Hubei Normal University, Huangshi 435002, China
*Email: fx681011@163.com

In recent years, the ecological environment of lake water has changed greatly, for this reason, To this end, it is proposed that modeling and analysis of the influence of canoe hydrodynamic force on Lake ecological environment. Take the dishui lake, a large artificial excavated lake in Lingang new town in Shanghai as an example, start with analysising of sediment and pollution sources in lake area, on the basis of 8-year routine water quality index and monitoring data of biological indicators, analysis on the growth and evolution of ecological environment of large artificial lakes, evolution characteristics and trend in development. Analysising of hydrodynamic conditions of canoeing, modeling and analyzing the influence of canoeing hydrodynamics on Lake ecological environment.

ecological condition; Canoeing; fluid dynamics; modeling and analysising

1 INTRODUCTION

Canoeing in water is propelled forward by human paddling, the power obtained by canoeing is related to the hydrodynamic performance of the blades, it directly affects the change of ship speed. However, the changes of lake ecological environment will have a directly impact on the hydrodynamic force of canoeing. So it is studied.

Yang He, Dingyou Yu, Junwei Wang, Yanli Du and others in Ekoloji's Issue 107 of 2019, an article entitled: "Modeling and Analysis of the Influence of Meteorological Comfort Ecosystem on Human Respiratory System" (He et al. 2019). The paper mentions the background of global warming, the influence of meteorological factors on respiratory diseases should not be neglected. In a meteorological comfortable ecosystem, utilization of meteorological data in the city and emergency and outpatient visits to respiratory diseases in third-class a hospital from 2007 to 2012, The influence of typical meteorological factors on human respiratory system is analyzed. an analysis model of the influence of meteorological comfortable ecosystem on human respiratory system was established, the relationship between main meteorological factors and human respiratory diseases was analyzed. And distribution characteristics of mortality in patients with respiratory diseases (Huang et al. 2013). The results of the model show that, respiratory diseases are most significantly associated with mean, minimum and maximum temperatures. The mortality rate of respiratory diseases has obvious seasonality in time distribution. In the summer half year, the climate environment of low pressure, high temperature and multiple precipitation have little influence on respiratory tract (Rajagopal et al. 2017). It is not easy to cause death of patients with respiratory diseases. In the winter half year, the climate characteristic humidity is higher, the mortality rate of respiratory diseases increased with the short sunshine time. In this paper, the impact of climate change on the respiratory

system in the ecological environment is modeled, the method of modeling can be applied to the study of the influence of lake ecological environment changes on the hydrodynamics of canoeing (Kim et al. 2016).

It is proposed in Deng et al. (2018), alpine lakes in Yunnan are very sensitive to regional climate change and human activities, some water bodies are facing increased pollutants at the same time, rapiding succession of biological communities, problems of ecosystem function reduction. The historical data of the Jabi Lake in the alpine region of northwest Yunnan show that: the lake has experienced obvious hydrological fluctuations and human activities since modern times. In this study, the chronological sequence of the sediments of Jabi Lake was determined, multi-index analysis of elements and granularity. It reconstructs the environmental change history of Jabi Lake in the past 300 years (Samples corresponding to the depth of 18 cm at the top of the borehole). The history of environmental change in Jabi Lake, combined with the analysis of diatom, the driving effects of climate change and human activities on community change were identified. The results show that: the sediment grain size records the long-term fluctuation of the hydrological changes in the Jabi Lake. The construction of reservoirs and the enhancement of hydrological regulation make the water level of lakes fluctuate obviously. It is basically consistent with the hydrological events recorded in the literature. Diatom community structure is dominated by phytoplankton species, before 1860, diatom assemblage was the dominant species with strong tolerance to water disturbance.at the same time become a sub-dominant species; beginning in 1990, benthic diatom sp. The relative abundance of genus increased and fluctuated obviously, appearance of trophic salts. Multivariate mathematical analysis shows that the combination of climate warming and changes in lake nutrient levels is an important factor driving the long-term succession of diatom assemblages in Jabi Lake. 27 of the community changes were independently explained. 5% and 21. 3%; among them, the import of exogenous substances increased due to the lake and reservoir renovation project, it makes the nutritional level rise as a whole. It is the cause of the obvious change of diatom assemblage since 1990s. Therefore, under the background of climate warming, the protection of alpine lakes in Yunnan needs comprehensive evaluation of watershed development and hydrological regulation.

Huang et al. (2018), the subfossil assemblage of chironomid in the 41 cm sedimentary core of Shahu Lake was analyzed. Combined with 210 Pb dating, Chironomid-Total Phosphorus Conversion Function Model in the Middle and Lower Reaches of the Yangtze River, Downward Trend Correspondence Analysis Method and Historical Data of Wuhan City (Detrended Correspondence Analysis, DCA), quantitative reconstruction of total phosphorus concentration in Lake water.it reveals the environmental evolution history of Shahu Lake since 1970s.The results show that: (1) From 1973 to 1989, the chironomid assemblage was dominated by aquatic vegetation related genera Cricotopus sylvestris-type and Dicrotendipes nervosus-type. It reveals the development of aquatic vegetation in lakes and the concentration of total phosphorus in the reconstructed water of Chironomid mosquitoes during this period is 47-55 ug/L, total phosphorus in sediments was maintained at 700 mg/kg. (2) From 1989 to 2002, total phosphorus in sediments nearly doubled. Meanwhile, the total phosphorus in water gradually increased to more than 100 ug/L. The relative abundance of chironomid species related to aquatic vegetation decreased significantly. The Lake enters eutrophic state. (3) Since 2002, total phosphorus in sediments continued to rise to more than 2000 mg/kg. Tanypus and Prosilocerus akamusi-type are dominant in chironomid assemblage, the concentration of total phosphorus in water was maintained above 150 ug/L. The first axis of DCA explained 62.1% of the variation of chironomid assemblage. The first axis score of DCA at sample sites was negatively correlated with total phosphorus in sediments. The results showed that chironomid mosquito assemblage mainly responded to lake nutrient enrichment process. This is mainly related to the shrinkage of Lake area and the increase of sewage inflow caused by urbanization in Wuhan. The results show that the nutrient background value of Shahu Lake is about 50 ug/L, reducing the input of exogenous nutrients is an important way

to protect the water environment of Shahu Lake. As mentioned in the above literature, the study of ecological environment changes does not take into account the influence of underwater kayak power. Here is a supplementary study.

2 IDEA DESCRIPTION

Dishui Lake is a newly excavated lake on the beach at the junction of Changjiang Estuary and Hangzhou Bay. The design considers that there is no sewage outlet around the lake for pollutant control, to put the end to the effects of man-made pollution, however, there are still some endogenous pollution and a small number of non-point sources affecting the endogenous pollution mainly due to the release of sediment from the original beach sediment. Dishuihu Lake is located in the Dongtan of Nanhui in the lower reaches of Changtao River Basin. The content of nutrients in sediments is high. The average nitrogen content and organic matter content were 0.027% and 5% respectively. 507%, total phosphorus 0. 166%. Under the disturbance of wind and waves. Sediments at the bottom of the lake suspend and release nutrients into the overlying water, formation of endogenous pollution. Many scholars have pointed out that: endogenous pollution is nitrogen in water, one of the important sources of phosphorus. Under the influence of this factor, even if the load of external pollution is greatly reduced, under certain conditions, algae outbreaks may still occur, resulting in eutrophication of water bodies Non-point sources are mainly pollutants carried by rainfall runoff. Although there is no sewage and other pollutants discharged into the dripping lake. However, rainfall runoff can carry nutrients from soil into Lake lambda. Nutrients come together in many ways, plus the evaporation of rainfall. Increased concentration of nutrients in water. At the same time, the water boat of the dripping lake, fishing and other tourism development projects also bring certain pollutants.

23 routine water quality monitoring points and 18 biological monitoring sampling points were set up in the waters of Xiaoshui Lake. Among them, the monitoring points of diversion water source are Dazhi River Xinchang and Dazhi River East Sluice: the monitoring point of diversion channel is located at Nanlu Highway Bridge in Erzaogang. Farm Central River and Suitang River: the monitoring point of the dripping Lake area is a vertical line of the central river. There are five vertical lines on the edge of three peninsulas. Two vertical lines of Ershentan: the monitoring points of drainage area have 8 vertical lines in the lake area of the sea gate (Fig. 2). The two vertical lines in Shentan were sampled at 3 locations of 0.4 and 0.8 relative depths. Other vertical lines were sampled at 2 locations of surface layer and relative water depth of 0.8. There are 18 sampling points, conventional water quality monitoring mainly includes: water temperature, pH value, suspended matter, turbidity, dissolved oxygen, chemical oxygen demand, manganate index, five-day biochemical oxygen demand, ammonia nitrogen, volatile phenol, total phosphorus, soluble total phosphate, total nitrogen, chloride, transparency, nitrate nitrogen, nitrite nitrogen, chlorophyll and salinity were 21 items. Biomonitoring is mainly concerned with the species and quantities of phytoplankton, zooplankton and benthic organisms. Sampling frequency is once a month, time is in the middle of each month.

3 Result

The hydrodynamic performance of sports equipment has been studied earlier in China. The research fields include water sports, track and field, ball games, swimming and so on. Especially since the 1980s, the research on water sports equipment has begun. A number of remarkable achievements have been achieved. In the past 20 years, with the support of the National Natural Science Foundation Committee, the State General Administration of Sports and the Ministry of Communications, the research on hydrodynamic performance of water sports equipment is closely centered on the goal of improving the scientific level of sports training in China. The research involves the aerodynamic performance of sails and the hydrodynamic performance of sailboard, rowing,

canoeing, webbing, water skiing and other items. Its achievements have been successfully applied in the preparation of the national team for the Olympic Games and the Asian Games. It has contributed to the establishment of sports techniques suitable for physical characteristics and the breaking of records to win gold medals in China. At the same time, it lays a foundation for the design of high-performance sports equipment. In this paper, the progress in the study of hydrodynamic performance of canoeing is reviewed, to provide reference for the study of hydrodynamic performance of sports equipment in China

3.1 Resistance analysis of canoe and blade in water

As we know, many sports are closely related to air and water. When exercising, the athlete's body and the equipment it uses are doing relative exercises with air and water. This will inevitably produce more or less resistance in sports, which will directly affect the results of the competition (Tang 2018). If the athletes master these mechanics problems well, understand thoroughly and use properly in the competition, they may create good results. On the contrary, it is possible to lose the game. The most common problem in sports is resistance. Generally speaking, according to common sense, most sports events want less resistance. But some sports, or at some stage of the sport, want greater resistance. Such as the case with canoeing. The force of canoeing moving forward in water is mainly obtained by the resistance caused by the contact between blades and water. From the point of view of fluid mechanics, this is the use of the reaction force of water. That is to say, when the blade moves in the water, it is resisted by the water, which in turn acts on the boat and pushes the boat forward. Obviously, in this process, the greater the resistance, the better. The physical definition of force is simply described as the mass of an object multiplied by acceleration. That is force (F) = mass (m) * acceleration (a), this shows that the acceleration obtained by an object under external force is proportional to the magnitude of external force, and is proportional to the mass of the object. The direction of acceleration is the same as that of the force. In addition, according to the principle of action force and reaction force of Newton's third law, the two forces coexist at the same time, and act in the same straight line in opposite directions. In order to promote the ship's progress, the athletes must exert a strong role on the blades, push the water backward, and produce a reaction force to push the ship forward. So canoeists should push back the still water as much as possible to increase the resistance of the water to the blades, so as to speed up the boat. Because the canoeing project in paddling, to do repetitive cyclic paddling movement, that is, after completing a paddling action, then to do a return action to prepare for the next action. Because the direction of the paddle is the same as the direction of the boat when doing repetitive actions, the resistance caused by the paddle movement becomes the disadvantage factor of the boat's advance. Therefore, when making water movements, canoeists should try their best to reduce the area of the paddle blade, the speed of return and the resistance. From this we can see that, the resistance of canoeists in different stages of paddling plays different roles, so the technical requirements for paddling are also very different. Using the theory of fluid mechanics, we can find out the special law of the same fluid resistance in canoeing, put forward reasonable technical requirements, adopt scientific training methods, and improve the competition results.

3.2 Analysis of influencing factors on the performance of canoe blades

Beauty and strength are the criteria of traditional Olympics. In many competitions, canoeing is a more perfect interpretation of the essence of the Olympic Games. However, at the 2004 Athens Olympic Games, the addition of computational fluid dynamics became the most important factor for canoeists to compete for gold medals. Canoeing is so attractive that we should better study the sport of canoeing and make it a dominant project in our country. It is well known that kayaking is progressing by the rhythmic paddling of the athletes. When the canoe is

propelled by the continuous rowing of the athletes, the boat will move forward in a wave manner, which is a complex problem of motion. For example, a heavy, powerful athlete is not necessarily the fastest rower. In order to maximize the efficiency of each stroke, it is necessary to further understand the factors affecting the speed of canoeing. Firstly, external factors; the research shows that the main factors affecting blade performance are frequency, immersion depth and angle of attack. The area with the highest propulsion efficiency is located near the angle when the propeller rod is perpendicular to the boat. Canoe blades have no fixed support points in the air, and their trajectories are uncertain, so their hydrodynamic characteristics are more complex. Secondly, the technical factors: the kayak's paddling technique is that the right hand is above the right shoulder, the elbow bends outward, the left hand relaxes and stretches forward so that the blade is as close to the side as possible. When inserting an oar, push the right hand forward, and then insert the blade rapidly into the water with the left hand down. With the help of the strength of the lumbar and dorsal muscles and the strength of the left leg pedal, the left hand along the side of the boat, parallel to the height of the hip bone and facing back to the waist, completes the pulling action. The right hand pulls the oar with the left hand and bends until it pushes forward and straightens. After pulling the oar, the left hand is raised rapidly and the wrist rotates outward to move on the left shoulder. By this time, the blade has been raised from the water and completed four actions of the paddling cycle. When the right blade is inserted into the water, the next paddling cycle begins. The technique of rowing is to bend the upper body forward, bend the upper arm slightly, stretch the lower hand forward as far as possible, combine with the forward and down pressure of the lower shoulder, stretch the upper hand forward to make the blade and the water surface into 65-75 degree angle and quickly insert the oar into the water. Through the lifting force of the lumbar and shoulder dorsal muscles, the trunk drives the two arms to pull the oars, so that the boat can get the greatest forward force. At the end of the pulling action at the waist position, the lower wrist rotates rapidly inward to pull the oar, the elbow moves outward, and the upper hand raises the blade to the surface. As soon as the blade leaves the water, the upper hand bends slightly, the trunk bends forward, and the lower hand bends forward to the pendulum paddle to complete the propeller pushing action, and then inserts the paddle to start the next action cycle. This movement requires the coordination and coherence of athletes in order to produce greater impetus.

3.3 Modeling analysis

Canoeing technology refers to repeated cyclic movements of athletes, i.e. periodic rowing. When canoeists are rowing, their arms, trunk, upper limbs and body are always moving along a certain trajectory, which is intrinsically related to the rationality of paddling technology. The blade surface of a canoe is perpendicular to the current, and it will be impacted by the current. The larger the blade surface, the greater the force. Generally, the blades of kayaks are 710-775c, and the blade surfaces of kayaks are 960-1090c. Only when the blade is completely immersed in water and perpendicular to the direction of the flow, the flow will vertically contact the entire blade surface, and the blade will be subject to the greatest resistance brought by the flow. According to the analysis of every paddle action completed by the athletes, the blades of the canoe go through three stages: catching stage, dynamic stage and steering stage.

3.4 Modeling principle

The main modeling principles of the system are power bond graph method and state equation method. Because the power bond graph method still has considerable technical difficulties in the automatic processing of non-standard bond graphs, and the state equation method is consistent with the power bond graph method, most of the software currently uses the state equation method to model.

Therefore, the study of US IM software is based on the state equation method as the core modeling theory to model the hydrodynamic system. In the simulation calculation, by solving the state variables of the hydraulic

system described by the state equation, the pressure, velocity, displacement and other important state variables of the dynamic characteristics of the hydraulic system can be obtained. In the schematic diagram, because the connection between components is mainly characterized by nodes, the software system uses the nodal cavity method to obtain the equation of state. The nodal chamber method is based on the fact that the hydraulic system can be regarded as either a single component or a complex component, in which the energy or signal transmission between components is usually realized through hydraulic pipelines.

3.5 Modeling of hydrodynamic effects of lake ecological environment changes on canoeing

There are generally two ways to realize graphical modeling of hydrodynamic system simulation: the first method is to redevelop the existing drawing software (e.g. lA OLT C A) D, establish the component graphics symbol library in the form of A UTOC A D block, use the graphics symbol library to build the system diagram, extract the connection information of the system by analyzing the D x l file of the system diagram, and generate the mathematical model. The second method is to develop our own drawing software independently. This can get rid of the dependence on other commercial software, but also reduce the hardware requirements. The tool L S IM system uses the second method to realize the graphical modeling of hydrodynamic system. Many IBMS use C++ as programming language and V 6C. 0 and M CF are implemented for development tools. Making full use of the convenience provided by the basic class library and framework structure of M CF in programming, the graphic symbol library of components is established by using the idea of object-oriented programming. By drawing and editing the system diagram, the system diagram is drawn, the system connection relationship is obtained through analysis, the model description file is generated, and the mathematical model needed for simulation is transformed.

4 Discussion

Canoeing technology refers to repeated cyclic movements of athletes, i.e. periodic rowing. When canoeists are rowing, their arms, trunk, upper limbs and body are always moving along a certain trajectory, which is intrinsically related to the rationality of paddling technology. The blade surface of a canoe is perpendicular to the current, and it will be impacted by the current. The larger the blade surface, the greater the force. Generally, the blades of kayaks are 710-775c, and the blade surfaces of kayaks are 960-1090c.Only when the blade is completely immersed in water and perpendicular to the direction of the flow, the flow will vertically contact the entire blade surface, and the blade will be subject to the greatest resistance brought by the flow. It is founded that the hydrodynamic analysis of canoeing will also change when the lake water ecological environment changes, thus affecting the speed of canoeing.

5 CONCLUSION

Using VC 6.0 and M FC as development tools, the graphical modeling of hydrodynamic system is realized by creating component class library, and the correct description file is obtained, which creates conditions for the next simulation calculation. This method simplifies the user's operation and reduces the user's requirement for knowledge such as computer programming. The application of graphical modeling method in hydrodynamic system will accelerate the popularization and application of the software and promote further research in this field.

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