

BIOMECHANICAL ANALYSIS OF WALKING AND TAKING-OFF ON SPRINGBOARD OF JIANGSU DIVING ATHLETES

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INTRODUCTION: Priority event and key event in the Chinese Olympic strategy, diving is becoming more difficult, i.e., advantage means difficult high-quality performance. As walking on springboard and jumping is key to diving performance, it is vital to study diving athletes to improve their diving skills.

METHODS: 1 Theoretical analysis – Establishing differential equation of dynamics satisfied by springboard, using moment balance equation of statics and function theorem of dynamics; deducing bending equation, equivalent quality, inherent frequency and vibration equation of springboard, using bending stress of material mechanics and free vibration of single-mode system of distortion and vibration mechanics. 2 Statics – Analyzing material mechanical character under static loads, using springboard load tests. 3 Vibration mechanics – Analyzing vibration mechanical character of springboard when walking on springboard, using acceleration sensor installed on springboard. 4 Sports research method – Photographing jumping actions of eight athletes at rate of 50 pictures/sec using JVC-DVL9800 camcorder at side (two-dimensional) and analyzing data using TEMA, to obtain sports parameters needed.

RESULTS AND DISCUSSION: 1. Before superior athletes jumped with right foot pressing at third step, board descended and springboard formed 1.5 vibration cycle. 2. Frequency of idle springboard stayed at 3.750 (Hz) and damped ratio at 1.5~2.0%, using acceleration sensor. 3. The closer fulcrum was to fixed end of springboard, the higher board frequency was. As fulcrum moved forward, board frequency fell. At increased board rigidity and unchanged fulcrum position, the closer it was to front end of board, the greater displacement was.

CONCLUSION: 1. Transformation of force received, and human-board coordination were assayed when athletes walked on springboard. Modification of hip, kneel and ankle joints and kicking and poking period were also assayed during human-board coordination. 2. In SPSS, factors for walking on springboard were analyzed and multiple regression equation worked out for the speed at which athlete left springboard. Factors included speed, height, angle speed and distance. 3. Human-board coordination moved with human quality and board quality as a whole, where frequency was that of human-board coordination, and centre of gravity and board movement when foot landed on board end were vertically consistent.

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