THREE-DIMENSIONAL KINEMATIC STUDY OF THE PADDLE STROKE IN INDIVIDUAL FLATWATER KAYAKING

Matilde Espinosa-Sánchez
Universidad Nacional Autónoma de México, Mexico City, Mexico

KEY WORDS: K1, kayaking, kinematics, paddle stroke, angles

INTRODUCTION: Propulsion in kayaking is achieved by alternating paddle strokes. One stroke on the right side of the boat followed by one stroke on the left constitutes a paddling cycle. Any asymmetry in the performance of the paddler affects the displacement speed of the kayak. Therefore, it is important to determine any movement differences between the right and the left stroke.
The one-person flatwater kayak is an extremely unstable boat. According to international rules, its length must not exceed 5.2 m, its width must not exceed 51 cm and its weight must not be less than 12 kg. The paddler uses a twin-blade paddle, with one on each end, as a propulsion instrument. Basically, each side of the kayak paddling technique is a movement system that can be analyzed in four main phases: entry of the blade into the water, pull of the paddle, exit of the blade from the water, and recovery.
The purpose of this study was to examine the differences in the performance of a K1 (individual kayak) paddler with respect to the range of movement of the elbows and shoulders during a paddling cycle, both in sustained paddling and during the first few strokes that constitute a start in a flatwater kayaking race. Thus, the main objective is to determine the possible asymmetries between the execution of the paddle strokes performed on the right side of the boat, and those performed on the left side.

METHODS: The methods used in this study comprised the following stages: video recording of paddling performance at 60 Hz, reconstructing the movements in 3-D in a PC using the DLT procedure, representing the body segments as straight lines delimited by specific anatomical points, interpolating and smoothing the data using cubic beta-splines, and finally calculating the angular displacement of the upper limbs of the paddler. No marks were used for locating the anatomical points.

RESULTS: The displacement results are presented in angle-angle diagrams, where the asymmetry in the paddling cycle can be observed.