# KINEMATIC CHARACTERISTICS OF THE PUSH-OFF OF THE 500 METER SHORT TRACK SPEED SKATING IN THE 19TH WINTER OLYMPIC GAMES

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**KEY WORDS:** short-track, speed skating, push-off, range of motion

**AIM OF THE RESEARCH:** The goal of this study was to explore the kinematics of the push-off in speed skating of Yang Yang, the women's 500-meter speed skating champion in the 19th Winter Olympic Games. Her performance in the push-off phase was compared to ten other sportswomen. It was the intent of this study to provide a theoretical basis for improving the training of short-track speed skaters.

**RESEARCH METHODS:** Video records from the second, third, and fourth cycles of 10 women in the 500 meter short-track speed skating championship from the 19th Winter Olympic Games were analyzed using a Ai Jie EIMG64NP-1 analysis system. These records included those of the champion, Yang Yang. Position data was sampled at 50 Hz and subsequently smoothed by way of a digital filter.

**RESULTS AND ANALYSIS:** According to the pictures' analyzing data, we drew hip and knee pushing off angle-time curves and angular velocity- time curves. Yang yang's pushing-off leg had two pushing-off courses and each time it pushed off ice, her knee joint stretch rang could reach to about 64 degrees,the lasting time of stretching was about 0.09 second,the internal of the two course was 0.16 second. We also found that the stretching range of her hip joint was 54 degrees, the movements of hip joints highly synchronize with knee joints, the hip angle-time curve is extremely similar with the knee angle-time curve. Bulgaria second prize winner Aigena and Chinese third prize winner Wang Chunlu also had the similar hip and knee angle-time curves but no better than Yang's. In addition, when Aigena and Wang Chunlu pushed off the ice, their stretching range was 55 degrees and Wang Chunlu's was 53 degrees. The two's hip joint stretching ranges were both below 50 degrees, that is to say smaller than Yang's. And judging from the curves we may found that Aigena and Wang Chunlu's hip joints movements and knee joints movements were not very harmonious. On the contrary, Yang 's knee joint curve and hip joint curve highly similar and its angular velocity was obviously larger than others were when she was pushing off the ice. Other sportswomen's knee joint stretching ranges were about 50 degrees. And hip joint stretching ranges were about 46 degrees, the hip and knee angle-time curves were similar but obvious,other sportswomen's hip curves and knee curves were rather similar, which tells us that the angular velocity changing law are similar but their angular velocity are smaller. Comparing with other sports women, Yang's another characteristic is that her hip and knee angle-time curves are extremely similar with her hip and knee angular velocity-time curves, which shows her hip and knee are highly harmonious when she is skating. And this is one of the reasons for good effects when skating.

**CONCLUSION:** A comparison of the kinematics of the championship performance to those of the other competitors reveaied the following: (1) Yang Yang's push-off leg had larger range of motion and angular velocities of the hip and knee joints and (2) Yang Yang's hip and knee movements were highly harmonious.

**REFERENCES:**

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