What causes inter-individual variability of rolling angular velocity in baseball batting? - Case study -

Takuya Yanaka¹, Shoji Konda², Toshimasa Yanai²

¹Graduate school of Sport Sciences, Waseda University
²Faculty of Sport Sciences, Waseda University

Mechanically, the angular velocity of the bat around its long-axis, called rolling angular velocity, can be generated with two mechanisms: (1) The angular impulse exerted by the batter’s hands around the long-axis of the bat generates the rolling: Mechanism 1 and (2) the change in the orientation of the long-axis of the bat with respect to the angular momentum vector of the bat generates the rolling: Mechanism 2. The purpose of this study was to determine which mechanism explains between-subjects different in the rolling angular velocity in baseball batting. An alley hitter (AH) and a long hitter (LH) performed eight-trials of free-batting. An electromagnetic tracking device (240Hz) was used to recorded three-dimensional orientation data of the bat during the performance. The rolling angular velocity of each batter was 146±299°/s (AH) and 1499±209°/s (LH) in top-spin direction at ball impact (BI). The rolling angular velocity due to the Mechanism 2 were 1600±177°/s (AH) and 1680±259°/s (LH) in top-spin direction at BI (p=0.51). The rolling angular velocity due to the Mechanism 1 of each batter was 1454±297°/s (AH) and 181±369°/s (LH) in back-spin direction at BI (p<0.01). These results indicate that the long hitter attains high rolling angular velocity and the Mechanism 1 causes the different in the rolling angular velocity in baseball batting.