

## The Role of Golf Swing Wrist Kinematics in Partial Shots of Varying Ball Flight Heights

**Authors :** Jacob Lindh, Kahin Kevin Lee, Yeuqing Li

**Abstract :** This study explores the kinematic differences in elite golfers' lead wrist motion during partial swings of varying heights. By measuring wrist mechanics in relation to ball flight control, the research aims to enhance understanding of how golfers adapt to different shot height demands. Golfers encounter diverse shot scenarios during tournament and practice play, requiring precision, control, and adaptability. This is particularly relevant for 'wedge' shots within 100 meters of the target. Furthermore, being able to control the ball's flight height on these shots provides players with an advantage, as golf course conditions are known to swiftly change with weather and seasonal conditions. Golfers often employ partial swings to improve their precision to short-distance targets. While previous research has established the biomechanical relationship between full and partial swings, there have been limited efforts in investigating the kinematic modifications that occur when golfers perform partial shots of different heights. This study measures the kinematic differences in elite golfers' lead wrist motion when they perform swings intending to result in shots travelling 60% of the flight distance of their full swing shots with the same club. Participants will begin with five full shots using a high-lofted club, followed by three low, three medium, and three high partial shots aimed at 60% of their average full-swing flight distance. Their lead wrist kinematics will be recorded using two different motion track systems (Xsens MTW Awinda & Deniz). The validity of their shots will be controlled using a launch monitor's (Trackman) carry distance and ball flight height data points. Data analysis (ANOVA) will be performed on the collected data to find the most significant variations. The study anticipates notable differences in wrist kinematics between high and low partial shots, particularly in lead wrist angular velocity and displacement. These insights can guide customized coaching and training practices tailored to golfers' individual needs and playing conditions. In addition, equipment manufacturers can use the findings to gain a deeper understanding of how their products are used and identify opportunities for improvement.

**Keywords :** golf, wrist kinematics, biomechanics, shot height

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