

Mitchell, S.R., Jones, R. and King, M.A., "Head Speed vs Racket Inertia in the Tennis Serve", *Sports Engineering*, 3(2), 2000, pp 99-110, ISSN 1369-7072.

Abstract:

An initial study of racket motion in the power serve executed by six tennis players was performed using several rackets with different inertia properties. Both two-dimensional high-speed video and three-dimensional active marker measurement techniques were employed at 4500 and 400 Hz sampling rates, respectively. The results indicate that a decrease in racket inertia, within realistic limits, can significantly increase the head speed achieved by skilled players. The racket's instantaneous centre of rotation position at impact, with respect to a locally defined frame of reference, was also found to be remarkably consistent for most subjects and all rackets tested. A larger scale study is necessary to confirm or deny these observations, but the initial findings encourage the view that realistic racket service performance comparison tests must take account of the variations in head speed likely to be achieved in play.