Introduction: The commercialization of cricket has increased the stakes for all involved. Conventional swing is one phenomenon which a bowler uses to gain an advantage over the batsman.

Conventional swing occurs as a result of asymmetric boundary layer separation. It is dependent on the following key parameters: ball velocity, seam angle and backspin on the ball.

Computational Methods: A computational model of a cricket ball was placed at a distance of 150 mm from the inlet boundary of the computational domain (Figure 2). A multi-stage modeling strategy was implemented.

The Turbulent Flow, k-ε interface was used to simulate the flow for a non-rotating ball while the Rotating Machinery, Turbulent Flow, k-ε interface was used for simulating flows in which backspin of the ball was considered.

Results:

Still Ball Flow Profile Analysis

Still Ball Force Analysis

Rotating Ball Flow Profile Analysis

Rotating Ball Force Analysis

Conclusions:

Moderate agreement with experimental research, namely the flow velocity profile and increase in side force coefficient with backspin.

In the simulations conducted, no case showed an expected transition region.

The k-ε turbulence model may not be suitable for this application or the model constants need to be redefined.

This study will allow the cricket community better understand the phenomenon of conventional swing and can be an integral part in the development of a conventional swing training aid.

References:
