Concussion Prediction for Speed Skater Impacting on Crash Mats by Computer Simulation Modeling

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Abstract : Concussion for speed skaters often occurs when skaters fall on the ice and impact the crash mats during practices and competition races. Gaining insight into the impact of interactions is of essential interest as it is directly related to skaters' potential health risks and injuries. Precise concussion measurements are challenging and very difficult, making computer simulation the only reliable way to analyze accidents. This research aims to create the crash mat and skater's multi-body model using Solidworks, develop a computer simulation model for skater-mat impact using ANSYS software, and predict the skater's concussion degree by evaluating the "head injury criteria" (HIC) through the resulting accelerations. The developed method and results help understand the relationship between impact parameters and concussion risk for speed skaters and inform the design of crash mats and skating rink layouts more specifically by considering athletes' health risks.