

From Simulate a Specific Baseball Pitch to Classify Types of Pitches

Mario Alberto Aguirre-López, Javier Morales-Castillo, F-Javier Almaguer
Universidad Autónoma de Nuevo León
marioal1906@gmail.com, tequilaydiamante@yahoo.com.mx,
almagerjavier@gmail.com

Abstract

Pitching machines have the task of reproduce pitches as close as possible to a baseball player. However, current machines use standard mechanisms which are based on the known types of pitches like curveball, slider, knuckleball, and so on. This work consist of two parts: The first one deals with the simulation of pitches. From the movement equations, synthetic data are generated by solving the direct problem for a specific trajectory. Then, some points of it are selected to obtain the corresponding initial conditions of the baseball. The Robinson and Robinson physical-mathematical model is used but with the spin axis and the angular velocity varying in time. In the second part we make a classification of baseball pitches based on an energetic analysis, and the relations between initial conditions of each throw. Results of simulations are accord to both, generated synthetic data and actual reported data in literature, which valid the methodology and help us to prove computationally the classification. Finally, an algorithm that allow applying the results to a pitching machine is developed.

References

1. R.K. ADAIR. The physics of baseball. Harper-Collins Publishers. 3a Edición. USA. (2002) 169 pp..
2. G. ROBINSON AND I. ROBINSON. The motion of an arbitrarily rotating spherical projectile and its application to ball games. Physica Scripta, The Royal Swedish Academy of Sciences. (2013) doi:10.1088/0031-8949/88/01/018101.
3. CH. THEOBALT AND I. ALBRECHT AND J. HABER AND M. MAGNOR AND H.-P. SEIDEL. Pitching a Baseball – Tracking High-Speed Motion with Multi-Exposure Images. Proc. SIGGRAPH '04. ACM SIGGRAPH (2004) 540-547 .