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Drag Crisis of Gyro-Balls YOSHIYUKI YOKOYAMA, Univ. of Electro-Commun., Dept. of Mech. Eng. and Intelligent Systems., TAKESHI MIYAZAKI, UEC, RYUTARO HIMENO, RIKEN — Using a high-speed video camera, we measured the trajectory and the rotation of a hard baseball thrown by a pitching machine which can launch Gyro-Balls (rifle spinning balls). We determined the drag- and lift- coefficients by analyzing the video images. The measurements were performed in the range of 0.6×10^5 <Re<2.5×10^5, and for three values of the spin parameter (SP : dimensionless spin rate)=0.12,0.23 and 0.35. Two seam patterns relative to the translational direction were investigated, i.e. 2-seam and 4-seam. The drag coefficient of a 4-seam gyro-ball with SP=0.12,0.23 and 0.35, decreases gradually with Re. However, the drag coefficient of a 2-seam gyro-ball with SP=0.12 decreases in two steps, i.e. in the ranges 0.8×10^5 <Re<1.0×10^5 and 2.0×10^5 <Re<2.2×10^5, and attains its minimum at Re=2.2×10^5. The drag coefficients of a 2-seam Gyro-Ball with SP=0.23,0.35 are almost constant below Re=$1.6\times10^5$and Re=1.3×10^5, respectively. Their minima are attained at Re=1.8×10^5 and Re=1.6×10^5, respectively. These findings confirm the occurrence of the drag crisis for Gyro-Balls. The different Re-dependencies are due to the different seam patterns.

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