

REBOUND CHARACTERISTICS OF BASEBALL IN DIFFERENT SURFACES

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INTRODUCTION: In recent years, the number of cases to introduce artificial turf in various fields as sports surface has increased. In Japan, many of stadiums that are the field of professional baseball have adopted artificial turf. In soccer and rugby, the guideline for the field of artificial turf is formulated by these associations. But, such a guideline doesn't exist for baseball stadiums.

This research aims to prepare basic data for guideline of the baseball stadium by comparison test between the fifth generation artificial turf, previous generation artificial turf, natural turf, and soil.

METHOD: The subjects of surface were fifth generation artificial turf (MONDTURF, MONDO Corp., Italy), previous generation artificial turf (NewGTB-16, Otsuka Turftech Co., Ltd., Japan), natural turf (Viktor, Nichino Ryokka Corp., Japan) and soil. The experiments of previous generation artificial turf, natural turf, soil were conducted in baseball stadiums. Hard ball, softball, and semi-hard ball were used in the experiments. The following three kinds of experiments were conducted using each surface and each ball. The movement of ball was recorded by a high speed video camera (250Hz), the two-dimension analysis method was used for calculating the kinematic variables in all experiments.

Experiment 1: The ball was freely fallen from the height of 2m, and the rebound height of the ball was calculated by two-dimension analysis method.

Experiment 2: The ball was thrown toward a perpendicular direction at a random speed, and the coefficient of repulsion was calculated from the incident velocity and reflection velocity.

Experiment 3: The ball was hit toward a obliquely downward direction by using bat at a random speed, and the decreasing rate of the horizontal velocity was calculated.

RESULTS AND DISCUSSION: The rebound height and coefficient of repulsion were 0.46 ± 0.04 (m) and 0.29 ± 0.02 (previous generation artificial turf), 0.33 ± 0.04 (m) and 0.25 ± 0.02 (fifth generation artificial turf) , and 0.19 ± 0.06 (m) and 0.13 ± 0.01 (natural turf) at the hard ball in Exp1 and Exp2. There were significant differences in these subjects ($p<0.01$). These results show that fifth generation artificial turf is possible to use for surface of baseball stadium.

About the use of the baseball, it is considered that the fifth generation artificial turf is suitable for use with baseball stadiums because it has characteristic that is nearer the natural turf than the previous generation artificial turf. About injury and performance, fifth generation artificial turf has been authorized as an official pitch for soccer, therefore there might not be problem in using for baseball stadium. But, it is necessary to examine the bases of turf, because the bases gave big influences to behavior of the ball.

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