Abstract Submitted
for the DFD19 Meeting of
The American Physical Society

Aerodynamic characteristics and flight behavior of the turbo-jav in the javelic throw HARUKI NAKAYAMA, Graduate School of Kansai University, TOMOYA NAKAJIMA, Osaka Prefecture University, TOMOAKI ITANO, Kansai University, SUGIHARA-SEKI MASAKO, Kansai University, Osaka University — In order to improve the record of the javelic throw in the junior Olympic games, it is important to elucidate the flight characteristics of the "turbo-jav" used in this throwing event. The turbo-jav has many geometrical features different from a spear for the javelin throw, including the presence of tail fins. In the present study, we performed wind tunnel tests in a low speed wind tunnel to measure the drag force, lift force and pitching moment exerted on the turbo-jav for various angles of attack. Using the aerodynamic coefficients obtained, we numerically calculated the flight orbit of the turbo-jav and the variation of its orientation, starting from the initial condition obtained at throwing experiments. The throwing experiments and numerical simulations showed that the turbo-jav flies with an oscillatory angle of attack around 0. The throwing distance predicted by the numerical simulation was found to be somewhat shorter than that obtained at the corresponding experiment. Since the amplitude of the oscillation in angle of attack during the flight was larger in the numerical simulation compared to that in the experiment, we proposed a new model in which the resistant term accompanying the unsteady pitching motion was taken into account.

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Date submitted: 31 Jul 2019 Electronic form version 1.4