MECHANICAL ENERGIES AND DISPLACEMENT OF THE BODY CENTER OF GRAVITY IN KARATE

HITOSHI OHMICHII (THE INTERNATIONAL BUDO UNIVERSITY)

FORCE PLATE, MECHANICAL ENERGY, NUMERICAL INTEGRATION, KICK

The present study was designed to investigate the methodology of biomechanical applications of a force plate to analyze the potential and kinetic energies and/or the vectors of displacement and velocity of the body center of gravity during the performance of "front kick" in karate.

Three dimensional forces were recorded from a triaxial force plate (AMTI), and integrated numerically by a mini-computer system to obtain the velocity and displacement data of the body center of gravity. Mechanical energies were calculated using these kinematic data every 0.01 seconds.

An international taekwondo instructor (Subj.A; male, 69kgw in BW, 172cm in Ht) and a recreational karate player (Subj.B; female, 50kgw in BW, 152cm in Ht) performed the front snap kick with 1) submaximal and 2) maximal efforts on the force plate (50x46x11 cm²).

The kinematic parameters in the trial 1) and the mechanical energy in the vertical direction in the trial 2) were shown in Fig.1 and Fig.2, respectively. In the latter case, Subj.A showed 110 Joules, 450 Watts, and 34 Kgw in peak values of energy, and power, and force, respectively. Subj.B showed approximately half values of these three parameters shown by Subj.A. On the other hand, Subjs A & B showed -530 and -110 Watts, respectively in the negative peak values of the power, which suggested that the trained subject could perform more quickly immediately after the impact than the untrained subject.

Fig.1 KINEMATIC PARAMETERS IN FRONT KICK
Fig.2 MECHANICAL ENERGY AND POWER

---

688