



A METHOD AND SYSTEM FOR PREDICTING BALLISTIC TIME-OF-FLIGHT AND RANGE OF AN UNGUIDED WEAPON

ABSTRACT

A method for predicting range and time-of-flight of an aerially delivered unguided
5 weapon (2) utilises theoretical equations (12, 30) approximating the theoretical range and
time-of-flight of ballistic trajectory motion in a vertical plane of a point-mass moving
over a flat non-rotating earth. The theoretical equations are modified utilising a plurality
of correction factors to provide empirical equations (39, 42) approximating the time-of-
flight (t_f) and range (r) of the weapon (2). Each correction factor comprises a function of
10 a correction constant (β_{1-33}) and a parameter selected from the group of weapon release
altitude (h), climb angle (γ) and true air speed (V), air density (ρ) and weapon time-of-
flight (t_f). Optimal values of the correction constants (β_{1-33}) are calculated using an
optimization process correlating solutions of the empirical equations (39, 42) with
ballistic results for the weapon (2). Predicted range (r) and time-of-flight (t_f) of the
15 weapon (2) are calculated by applying the aircraft climb angle (γ), true air speed (V) and
altitude (h) and the optimal correction constant values (β_{1-33}) to the empirical equations
(39, 42).

Figure 1.



G00002