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CHAPTER II

AIRCRAFT LANDING MODEL

1. Equations of Motion

The two-dimensional model for aircraft motion presented in this section follows the general form developed by Frost [12]. It accounts for both vertical and horizontal mean wind components having both time and spatial variations.

The aircraft trajectory model employed in this study was derived based on the following assumptions:

a) The earth is flat and non-rotating.

b) The acceleration of gravity, g, is constant (9.8 m/sec^2).

c) Air density is constant (1.23 kg/m^3).

d) The airframe is a rigid body.

e) The aircraft is constrained to motion in the vertical plane.

f) The aircraft has a symmetry plane (the x-z plane).

g) The mass of the aircraft is constant.

h) Initial flight conditions are for steady-state flight.

Figure 1 illustrates the forces acting on the aircraft. These include:

$\vec{F}_T$ thrust of the engines

$\vec{L}$ lift

$\vec{D}$ drag

$\vec{W}$ wind velocity

$m\vec{g}$ gravitational force.