```cpp
#pragma once

#include "Math.hpp"

// drag force in body frame
inline Vector3 computeDrag(const Vector3 &v_I,
                           const Matrix3 &R_IB,
                           double rho,
                           double Cd,
                           double A_ref)
{
    double v_mag = norm(v_I); // speed

    if (v_mag < 1e-6) {
        return Vector3(0.0, 0.0, 0.0);
    }

    // drag magnitude
    double D_mag = 0.5 * rho * v_mag * v_mag * Cd * A_ref;

    // drag direction: opposite to velocity_inertial
    Vector3 drag_direction_I = (-1.0 / v_mag) * v_I;

    // drag force in inertial
    Vector3 F_drag_I = D_mag * drag_direction_I;

    return F_drag_I;
}

// air density
inline double airDensity(double altitude)
{
    double rho_0 = 1.225;  // sea level density [kg/m^3]
    double H = 8500.0;     // scale height [m]

    return rho_0 * std::exp(-altitude / H);
}
```