

```

L = 1;
A = (40e-3)^2;
E = 210e9;
P = 5e3;

```

```

moment_of_inertia = (40e-3)^4 / 12;

```

```

k = (E * moment_of_inertia) / L^3 * [12, 6*L, -12, 6*L;
    6*L, 4*L^2, -6*L, 2*L^2;
    -12, -6*L, 12, -6*L;
    6*L, 2*L^2, -6*L, 4*L^2];

```

```

F = [P*L/2, P*L^2/12, P*L/2, -P*L^2/12];

```

```

syms q1 q2 q3 q4;

```

```

q1 = 0;

```

```

q2 = 0;

```

```

q = [q1; q2; q3; q4];

```

```

F = [P*L/2; -P*L^2/12];

```

```

w = k(3:4, 3:4) * q(3:4) - F;

```

```

solution = solve(w);

```

```

q3 = double(solution.q3);

```

```

q4 = double(solution.q4);

```

```

q = [0; 0; q3; q4];

```

```

function v = hermite_shape_function(xi, q)

```

```

    N = [2*xi^3 - 3*xi^2 + 1;

```

```

        xi^3 - 2*xi^2 + xi;

```

```

        -2*xi^3 + 3*xi^2;

```

```

        xi^3 - xi^2];

```

```

    v = N * q;

```

```

    disp('deflection::');

```

```

    disp(v);

```

```

end

```

```

function moment = bending_moment(E, I, q)

```

```

    syms x;

```

```

    M = [2*x^3 - 3*x^2 + 1;

```

```

        x^3 - 2*x^2 + x;

```

```

        -2*x^3 + 3*x^2;

```

```

        x^3 - x^2];

```

```

    v = M * q;

```

```

    eq = v(3) + v(4);

```

```

    dV_dx_2 = diff(eq, x, 2);

```

```

    dV_dx_2at_x0 = subs(dV_dx_2, x, 0);

```

```

    moment = E * I * dV_dx_2at_x0;

```

```

end

```

```

H = zeros(4, 2);

```

```

max_deflection = hermite_shape_function(1, q);

```

```

moment = bending_moment(E, moment_of_inertia, q);

```

```

disp('deflection::');

```

```

disp(max_deflection);

```

```

disp('bending_moment::');

```

```

disp(moment);

```

