

```

1 function [ state_dot ] = SatellliteDynamics_a( t, state, parameters )
2 % parameters = {G, m_T, norm_r_c_in_a}
3 %
4 % state = [r_c;
5 %          R_ba;
6 %          v_c;
7 %          omega_ab];
8 % state = [r_c1; r_c2; r_c3;
9 %          R_ba1; R_ba2; R_ba3; R_ba4; R_ba5; R_ba6; R_ba7; R_ba8; R_ba9;
10 %          v_c1; v_c2; v_c3;
11 %          omega_ab1; omega_ab2; omega_ab3]
12 % The code must return in the order you selected, e.g.:
13 %     state_dot = [velocity;
14 %                  orientation_dot;
15 %                  acceleration (ac);
16 %                  angular acceleration (omega dot)];
17
18 r_c = state(1:3);
19 v_c = state(13:15);
20 omega_ab_in_b = state(16:18);
21 R_ba_vec = state(4:12);
22
23 x = [r_c; v_c; omega_ab_in_b];
24 R = reshape(R_ba_vec, [3,3]);
25
26 G = parameters{1};
27 m_T = parameters{2};
28 norm_r_c_in_a = parameters{3};
29
30 grav_force = -G * m_T / norm_r_c_in_a^3;
31
32 M = [zeros(3),          eye(3),    zeros(3);
33      grav_force * eye(3), zeros(3), zeros(3);
34      zeros(3),          zeros(3), zeros(3)];
35
36 x_dot = M * x;
37 R_dot = R * skewsym3x3(omega_ab_in_b);
38 R_dot_vec = reshape(R_dot, [9,1]);
39
40 state_dot = [x_dot(1:3); R_dot_vec; x_dot(4:end)];
41
42
43 end
44

```