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1 % Sounak Ghosh
2 % 9/11/19
3 % ECE 202 - Fall 2019 - MATLAB Exercise M2 - Design Problem
4 % Equation source: http://www.convertalot.com/elastic\_collision\_calculator.html
5 % MATLAB script to determine the mass of a cart.
6
7
8 clear % clears all variables in the workplace; avoids common errors
9
10 % ----- given information -----
11
12 m2 = 150; % mass of the cart#2 in g
13 v1i = 30; % initial velocity of cart#1 in cm/s
14 v2i = -30; % initial velocity of cart#2 in cm/s
15 v1f = 0; % final velocity of cart#1 in cm/s
16
17 % ----- calculations -----
18 % (c)
19
20 m1 = m2*(v1f + v1i - 2*v2i) / v1i - v1f % Mass of cart#1 in g using v1f
21 % from M1 that uses
22 % momentum conservation
23 % and kinetic energy
24 % conservatio
25
26 M = m1 + m2; % total mass of cart#1 and cart#2 in g
27
28 v2f = (2*m1*v1i - m1*v2i + m2*v2i)/ M % final velocity of cart#2 in cm/s
29 % using momentum conservation
30 % and kinetic energy
31 % conservation
32
33
34 % ----- check answers -----
35 % (e)
36 check_p = m1*v1f + m2*v2f - (m1*v1i + m2*v2i) % The change in the total
37 % momentum of the system
38 % before & after the
39 % collision should be
40 % zero.
41 check_Energy = m1*v1f^2 + m2*v2f^2 - (m1*v1i^2 + m2*v2i^2)
42 % The change in the total
43 % energy of the system
44 % before & after the
45 % collision should be
46 % zero.
47
48 % (f)
49 v1f = (m1*v1i - m2*v1i + 2*m2*v2i)/ M % final velocity of cart#1 in cm/s
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50                                     % should be zero as the cart#1
51                                     % is stopping after collision.
52 % The design criterion is met as we can see that the velocity of cart#1
53 % after the collision is zero. Based on the equation of final velocity of
54 % cart#1 from M1.
55
56
57
58
59
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