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clear

m = 1000;   % mass of car body
k = 10000;  % spring constant for front and rear springs
c = 200;    % damping coefficient for front and rear dampers



L = 1.5;    % position of cm when car level and springs relaxed
wb = 2;     % wheel base of car
M=m/12*wb^2;  % moment of inertial for rod of mass m and length wb



dt = 0.001;
n=10000;


p(1) = 1.5;   % initial position of cm
v(1) = 0;   % initial velocity of cm

ang(1) = 0;     % initial body angle
vang(1) = 0;    % initial velocity of body angle

% a level road this trip so no r function

t(1) = 0;

for i=2:n+1

  t(i) = t(i - 1) + dt;

  % compute vertical position and velocity of front and
  % rear of car at start of subinterval i-1

  pf = p(i-1) + (wb/2)*sin(ang(i-1));
  vpf = v(i-1) + (wb/2)*vang(i-1);
  pr = p(i-1) - (wb/2)*sin(ang(i-1));
  vpr = v(i-1) - (wb/2)*vang(i-1);

  Ff = k*(L - pf) + c*(-vpf); % force on front of car from sping/damper

  Fr = k*(L - pr) + c*(-vpr);  % force on rear of car from sping/damper


  p(i) = p(i-1) + v(i-1)*dt;
  a = (Fr + Ff)/m - 10;
  v(i) = v(i-1) + a*dt;

  ang(i) = ang(i-1) + vang(i-1)*dt;
  aang = (-Fr + Ff)*wb/2/M;
  vang(i) = vang(i-1) + aang*dt;


end

plot(t, p - (wb/2)*sin(ang))   % plot vertical position of rear of car
hold on
plot(t, 3 + p + (wb/2)*sin(ang))  % plot vertical position of front of car offset by
3
hold off
```