

```

function [a ecc inc raan aop nu0 meanmotion M0] = getOrbitalElements(r, v)
%canonical units and column vectors please

h = cross(r,v);

p = norm(h)^2;

ecc_vec = (norm(v)^2 - 1/norm(r))*r - dot(r,v)*v;

ecc = norm(ecc_vec);

if (ecc == 0)
    disp('Do Something about circular orbit')
end

a = p/(1-ecc^2);

meanmotion = (1/a)^(1.5);    %rad/TU

inc = acos(h(3)/norm(h));

if (inc == 0)
    disp('Do Something about equatorial orbit')
elseif (inc == pi)
    disp('Do Something about polar orbit')
end

n_vec = cross([0; 0; 1],h);

raan = acos(n_vec(1)/norm(n_vec));
if (n_vec(2) < 0)
    raan = 2*pi - raan;
end

aop = acos(dot(n_vec,ecc_vec)/(norm(n_vec)*ecc));
if (ecc_vec(3) < 0)
    aop = 2*pi - aop;
end

nu0 = acos(dot(ecc_vec,r)/(ecc*norm(r)));
if (dot(r,v) < 0)
    nu0 = 2*pi - nu0;
end

num = ecc + cos(nu0);
den = 1 + ecc*cos(nu0);
EccAnom0 = acos(num/den);

M0 = EccAnom0 - ecc*sin(EccAnom0);

end

```

Input argument "r" is undefined.

Error in ==> getOrbitalElements at 4  
h = cross(r,v);

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