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include(".././../code/sfd.jl")
using .SpaceFlightDynamics

# sc: a (km) | e | i (deg) |  $\Omega$  (deg) |  $\omega$  (deg) |  $\nu$  (deg)
# 1_oe: 15e3 | 0.4 | 60 | 45 | 0 | 145
# 2_oe: 21e3 | 0.6 | 90 | 0 | 0 | 35
oe_sc1 = OrbitalElements(15000.0, 0.4, 60.0, 45.0, 0.0, 145.0)
oe_sc2 = OrbitalElements(21000.0, 0.6, 90.0, 0.0, 0.0, 35.0)

# time step of 1 hr (in seconds)
dt = 3600.0

# new state vectors and oe for each spacecraft
sv_sc1_new, oe_sc1_new = kepler_predict(oe_sc1, dt)
sv_sc2_new, oe_sc2_new = kepler_predict(oe_sc2, dt)

println("Predicted State Vectors after $(dt) seconds:")
println("\nSpacecraft 1:")
println("\tPosition Vector (r): ", round.(sv_sc1_new.r, digits = 3), " km")
println("\tVelocity Vector (v): ", round.(sv_sc1_new.v, digits = 3), " km/s")
println("\nSpacecraft 2:")
println("\tPosition Vector (r): ", round.(sv_sc2_new.r, digits = 3), " km")
println("\tVelocity Vector (v): ", round.(sv_sc2_new.v, digits = 3), " km/s")

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Predicted State Vectors after 3600.0 seconds:

Spacecraft 1:

Position Vector (r): [-14754.446, -14940.167, -227.462] km
Velocity Vector (v): [1.243, -1.143, -2.922] km/s

Spacecraft 2:

Position Vector (r): [-10530.276, 0.0, 16718.206] km
Velocity Vector (v): [-4.608, 0.0, 0.365] km/s