| **Notes:(Record key insights from readings and discussions.)** |
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| **Week-8**  **Thursday: -**  Calculating Hohman transfer orbital with error terms:  Step1: First step has no equations  Step 2: Earth’s distance from sun:  Mars distance from sun:  Step3: Gravitational parameter:  Step4: Orbital Periods in seconds:  Step5: Compute the Semi-Major Axis of the Transfer Orbit:  step6: Find the period of the Hohmann Transfer Orbit:  (3.141592653589793 ± 5e-16)2 = 9.869604401089359 ±  9.869604401089359 × 2 × 5e-16 ÷ 3.141592653589793  (3.141592653589793 ± 5e-16)2 = 9.869604401089359 ±  19.739208802178717 × 5e-16 ÷ 3.141592653589793  (3.141592653589793 ± 5e-16)2 = 9.869604401089359 ±  9.8696044010893585e-15 ÷ 3.141592653589793  (3.141592653589793 ± 5e-16)2 = 9.869604401089359 ± 3e-15  P(Hohman transfer) = √(4 × 9.869604401089359 ± 3e-15 ×  (188760000 ± 5e4)3 / 1.327e11 ± 5e7)  4 × 9.869604401089359 ± 3e-15 = (4 × 9.869604401089359) ± (4 × 3e-15)  = 39.4784176044 ± 4 × 3e-15  = 39.4784176044 ± 12e-15  = 39.4784176044 ± 2e-14  P(Hohman transfer) = √(39.4784176044 ± 2e-14 ×  (188760000 ± 5e4)3 / 1.327e11 ± 5e7)  (188760000 ± 5e4)3  = 1887600003 ± (3 × 5e4 ÷ 188760000 × 1887600003)  = 6.725582525376001e24 ± (3 × 5e4 ÷ 188760000 × 6.725582525376001e24)  = 6.725582525376001e24 ± (1.5e5 ÷ 188760000 × 6.725582525376001e24)  = 6.725582525376001e24 ± (0.00079465988 × 6.725582525376001e24)  = 6.725582525376001e24 ± 5.3445506e21  = 6.725582525376001e24 ± 5e21  = 6.726e24 ± 5e21  P(Hohman transfer) = √(39.4784176044 ± 2e-14 ×  6.726e24 ± 5e21 / 1.327e11 ± 5e7)  **P(Hohman transfer) = √(2.655e26 ± 2e23 / 1.327e11 ± 5e7)**  **2.655e26 ± 2e23 / 1.327e11 ± 5e7**  **= 2.0007536e15 ± (2e23 ÷ 2.655e26 + 5e7 ÷ 1.327e11) × 2.0007536e15**  **= 2.0007536e15 ± (0.00075329566 + 0.00037678975) × 2.0007536e15**  **= 2.0007536e15 ± 2.2610225e12**  **= 2.0007536e15 ± 3e12**  **= 2.001e15 ± 3e12**  P(Hohman transfer) = √(2.001e15 ± 3e12)  √(2.001e15 ± 3e12)  = √(2.001e15) ± (0.5 × 3e12 ÷ 2.001e15 × 44732538.4927)  = 44732538.4927 ± (0.5 × 3e12 ÷ 2.001e15 × 44732538.4927)  = 44732538.4927 ± (1.53e12 ÷ 2.001e15 × 44732538.4927)  = 44732538.4927 ± 34203.2902501  = 44732538.4927 ± 3.42032902501e4  = 44740000. ± 4e4  P(Hohman transfer) = 44740000. ± 4e4 s  Step7: Find the Velocity of Earth’s Orbit:  V1(Earth) = (2𝜋 × R1(Earth) km) / P1(Earth) s  V1(Earth) = 2×3.141592653589793 ± 5e-16 × 149600000 ± 5e4 km / 31558149.504 ± 5e-4 s  Firstly, we will perform multiplication of the error term.  =2×3.141592653589793 ± 5e-16 × 149600000 ± 5e4 km  =6.28318530738± 5e-16× 149600000 ± 5e4 km  =939964521.984 ± (7.9577472e-17 + 3.342246e-24) × 939964521.984  =939964521.984 ± (4.63139960923× 939964521.984)  =939964521.984 ± 4353351319.81  =9.39964521e-11 ± 4.353351319e-11  Now, we will perform division  9.39964521e-11 ± 4.353351319e-11 / 31558149.504 ± 5e-4 s  =29.7851596737 ± (4.631399609233445e-9 + 1.5843768023743755e-11) ×29.7851596737  =29.7851596737 ± (2.04107271) ×29.7851596737  =29.7851596737 ± 60.7936765731  V1(Earth) =29.7851596737 ± 60.7936765731 km/s  Step8: Find the velocity of Mar’s Orbit:  V2(Mars) = (2𝜋 × R2(Mars) km) / P2(Mars) s  V2(Mars) = 6.28318530738± 5e-16 × 227920000 ± 5e3 km /59329255.68 ± 5e-3  Firstly, we will perform multiplication of the error term.  6.28318530738 ± 5e-16 × 227920000 ± 5e3  =1432063595.26 ± (5e-16/6.28318530738 + 5e3/227920000) ×1432063595.26  =1432063595.26 ± (7.957747154340941e-17 + 0.000021937521937521936) ×1432063595.26  =1432063595.26 ± (0.00002193752193800786) ×1432063595.26  =1432063595.26 ±31415.926537638657  Now, we will perform division  1432063595.26 ±31415.926537638657/59329255.68 ± 5e-3  =1432063595.26 ± 3.1415926537638657e-16/ 59329255.68 ± 5e-3  =24.137562132652057 ± (2.193752193800786e-25 + 8.427545470936204e-11) ×24.137562132652057  =24.137562132652057 ± (8.427545470936226e-11) × 24.137562132652057  =24.137562132652057 ± 2.0342040243047356e-9  V2(Mars)= 24.137562132652057 ± 2.0342040243047356e-9 km/s  Step9: Find the Velocity of the Hohmann Transfer Orbit at its Perihelion (Earth)  Solving first,    Now solving this, (2𝜋 × a(Hohmann transfer) km / P(Hohmann transfer) s).  Now,  Now,  Step10: Find ∆V1(Earth) (the change in Velocity required to enter the Hohmann Transfer orbit at perihelion)  ∆V1(Earth) = 2.941817869043946 km/s |
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| **Deliverable Status** | | | | |
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| **Deliverables** | **What did you plan to accomplish** | **What did you actually accomplish** | **Size** | **Effort** |
| Double calculator part -4 | * Planned to conduct meetings on the part 4 of the double calculator, to understand the requirements of the part-4 calculator. * Planned to add the error term operand in the user interface. * Planned to clear any doubts in the requirements and be clear. | * Will conduct team conduct team meetings on the part 4 for better understanding of the requirements. * Adding the error operand in the user interface. * Cleared the doubts in double calculator part 3 | 10% | 1 hour |
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