Model Rocket Launch Analysis - Fuzebox P2 (L1) (Estes-Style Rough Calculation)

Rocket & Motor Data

- **Rocket dry mass:** 24.875 g
- **Motor mass (A10-P):** 7.4 g
- **Liftoff mass:** 32.275 g (0.032275 kg)
- **Radius:** 0.45 in → Diameter ≈ 22.86 mm
- **Reference area:** $A \approx 4.11 \times 10^{-4}$ m²
- **Engine:** A10-P, average thrust ≈ 4 N
- **Burn time:** $t_b = 0.22$ s
- **Drag coefficient (assumed):** $C_d \approx 1.0$
- **Air density:** $\rho \approx 1.225$ kg/m³

Estes-Style Rough Calculations

- **Net acceleration during burn:** $a_{net} \approx 113.7$ m/s²
- **Burnout velocity:** $v_b = a_{net} \cdot t_b \approx 25.0$ m/s
- **Altitude gain during burn:** $h_{burn} \approx 2.75$ m
- **Average downward acceleration during coast:** $a_{coast} \approx 9.37$ m/s²
- **Altitude gain during coast:** $h_{coast} \approx 33.36$ m
- **Total apogee (drag-adjusted, rough estimate):** $h \approx 36.1$ m (≈118 ft)

Final Result

- **Total projected apogee:** 36.1 m (≈118 ft)
- **Note:** This is a rough calculation based on average thrust and approximate drag.