

Physics 504 Ordinary Homework #7

Due: April 7, 2011

1. [10 pts] Do Jackson Problem 11.6. You will need to find the acceleration in the Earth reference system which corresponds to the fixed proper acceleration (acceleration in the momentary rest frame of the rocket). This is easily found from the velocity addition formula, differentiating and **then** setting $u' = 0$, as the spaceship is at rest in its own reference frame.
2. [5 pts] We are dealing here with an algebra, objects which can be multiplied together and by real or complex numbers, and can be added, but don't necessarily commute. Show for any two such objects, A and B , and a real (or complex) number t , that

$$e^{tA} B e^{-tA} = \sum_{n=0}^{\infty} \frac{t^n}{n!} \Omega_n(A, B),$$

where $\Omega_0(L, B) = B$, $\Omega_n(L, B) = [L, \Omega_{n-1}(L, B)]$ for $n \geq 1$.

[Hint: write the left hand side as a power series in t , and show by induction on n that the coefficients are as stated.]

3. [5 pts] Do Jackson Problem 11.11. I found it easier to differentiate with respect to λ and use the previous result.
4. [5 pts] Do Jackson Problem 11.14a and 11.14b.