

Astro 250: Part II of “Planet Formation by Coagulation” (Sections 7-12)

SIGN-UP FOR AT LEAST 1 QUESTION:

1. Reproduce equations 71, 73, and 74 that are argued to be relevant for the formation of Kuiper belt objects. The Kuiper belt today is known to contain ~ 10 Pluto-sized objects (Brown 2008). Can the physical system embodied in these equations explain the formation of ~ 10 Plutos (with suitable adjustment of input parameters) : Chris Ormel
2. Reproduce equations 77, 78, and 79 : Lecoanet
3. Reproduce equation 80. Also on page 578: “Runaway addresses how the radii of two large bodies increase with respect to each other and not how each individually evolves in time. In the literature these two distinct behaviors are frequently confused.” Explain what the authors are griping about : Lecoanet
4. Define oligarchy, and its two sub-cases “dispersion-dominated” and “shear-dominated.” Specify the radial separation between big bodies in both cases : Weiss
5. Derive equations 88 and 89 for the end of oligarchy: Lee
6. page 583: “Do oligarchs grow more by coalescing than by eating small bodies?” Answer this question : ?
7. Reproduce equations 107 and 108 for the fast planet formation limited by gravitational instability of the disk of small bodies: Schwab
8. What happens when $\Sigma \sim \sigma$ and why? Consider both shear-dominated and dispersion-dominated oligarchies : ?
9. Reproduce equation 114 for the ejection time of a planet : Petigura
10. Equation 109, appropriate for a dispersion-dominated oligarchy, is in error. What is the error : ?
11. “Clean up was both the last and longest stage in the evolution of the Solar System. It is ongoing in both the asteroid and Kuiper belts.” How much mass is in the asteroid and Kuiper belts today relative to that in (solid component of) the minimum-mass disk : ?
12. page 589: “Oligarchy does not occur for very flat disks with $u < \sqrt{\alpha} v_H$.” Why : ?

PERSONAL CONTRIBUTION:

1. ?
2. ?
3. ?
4. ?
5. ?
6. ?
7. ?