

1107-85-54

**Robert J. Vanderbei\*** (rvdb@princeton.edu), Operations Research & Financial Engineering,  
209 Sherrerd Hall, Princeton, NJ 08544. *Numerical Optimization Applied to Space-Related  
Problems.*

Techniques for numerical optimization have been wildly successful in an amazingly broad range of applications. In the talk, I will go into some detail about two particular applications that are both “space related”. The first application is to the design of telescopes that can achieve unprecedentedly high-contrast making it possible to directly image extra-solar planets even though their host star is billions of times brighter and has a very small angular separation from the planet. The second application is to use optimization to find new, interesting, and often exotic solutions to the n-body problem. Finding such orbits could inform us as to what type of exoplanetary systems might exist around other nearby stars. In these two applications, I will explain enough of the physics to make the optimization problem clear and then I will show some of the results we have been able to find using state-of-the-art numerical optimization algorithms. (Received December 17, 2014)