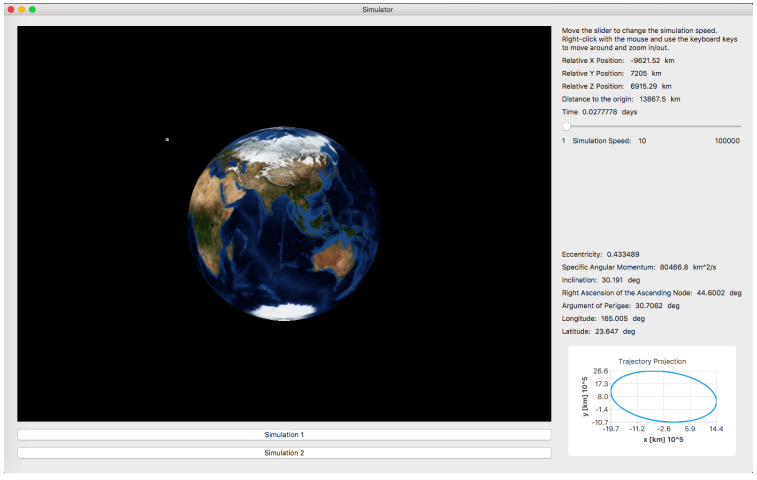
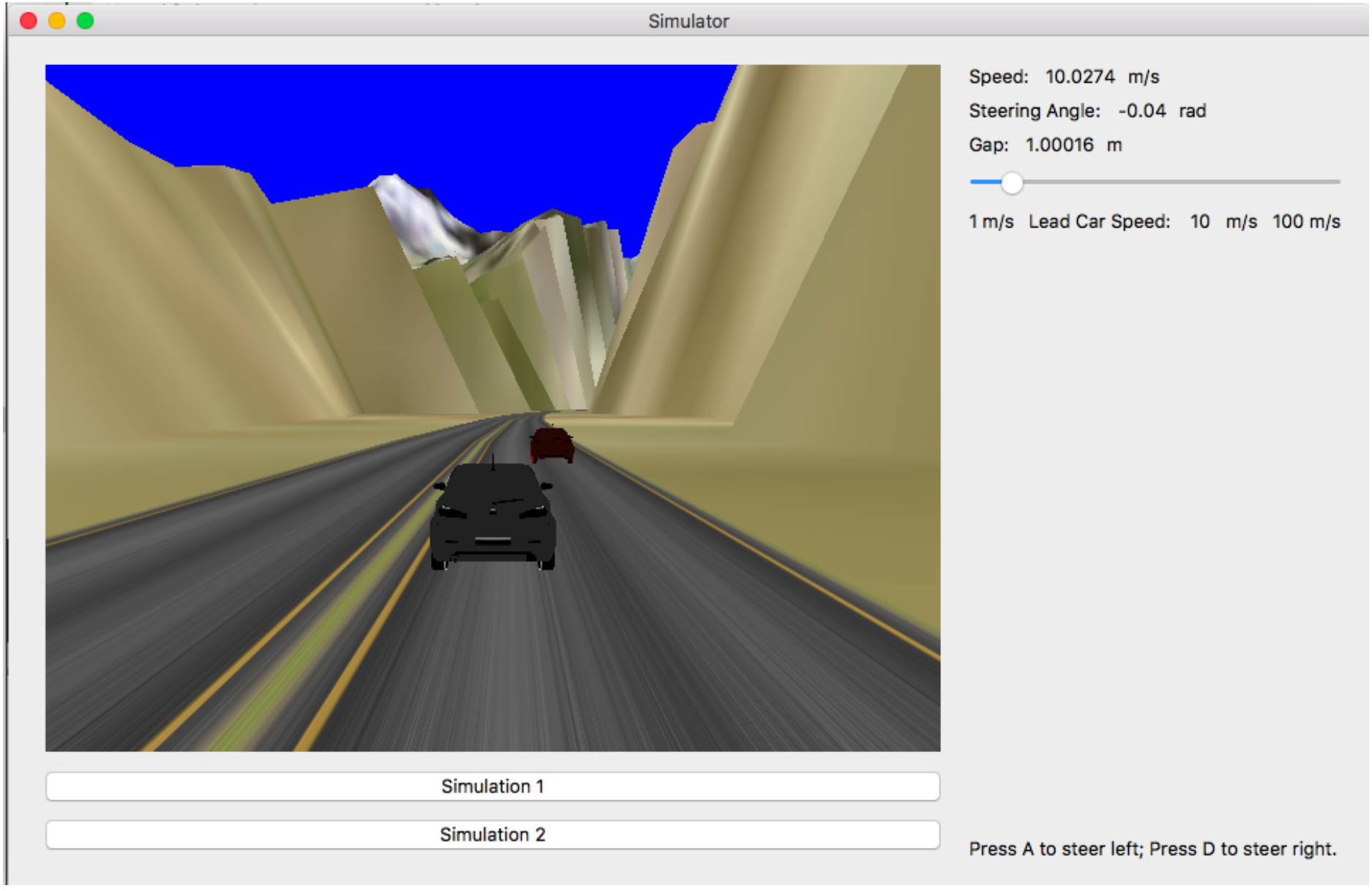
Project Portfolio (selected projects)



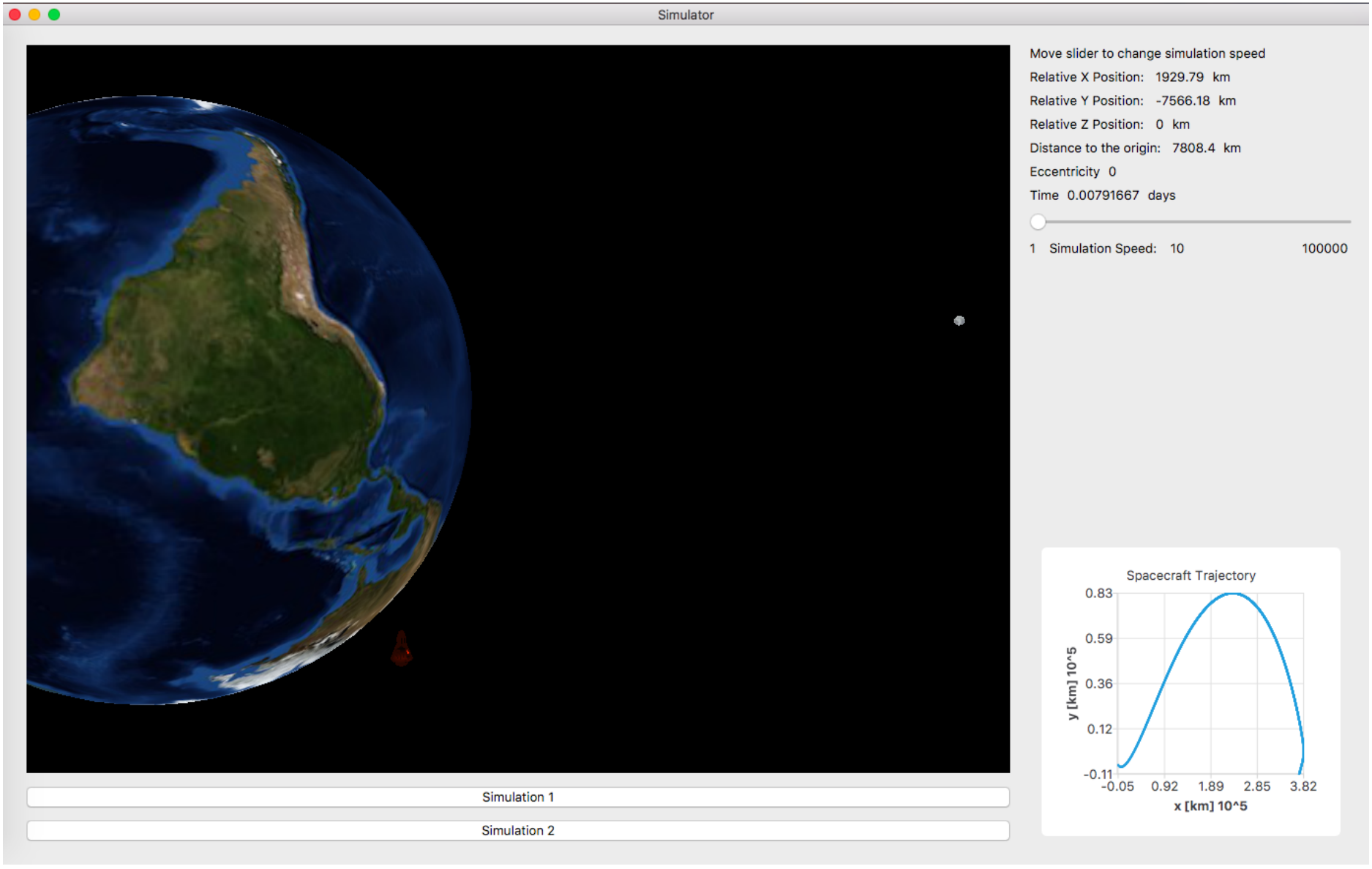
Gurgen (Greg) Hayrapetyan

June 15, 2017

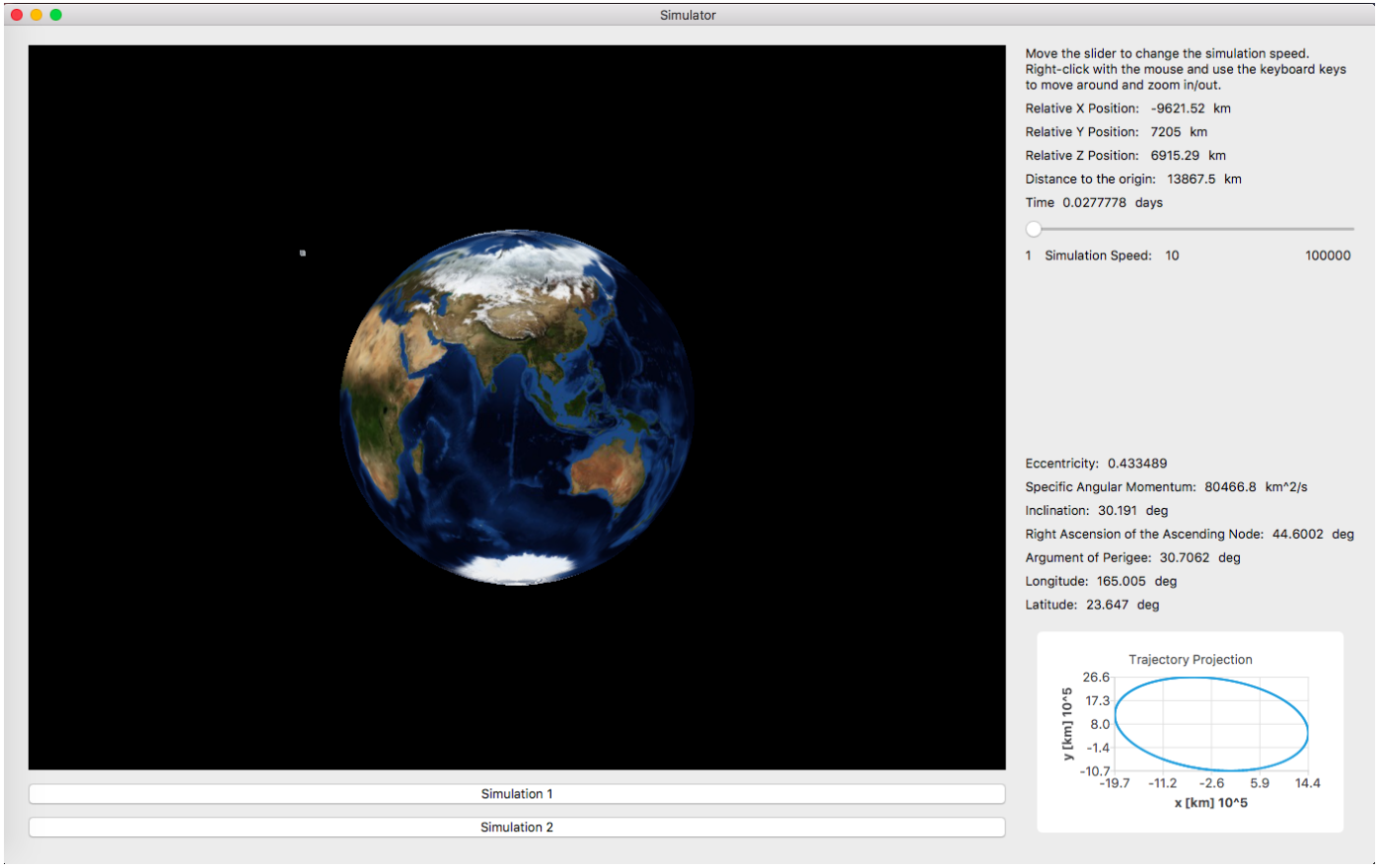
Adaptive Cruise Control Simulation



Restricted Three-Body Problem Simulation



Satellite Tracking - Lambert's Problem

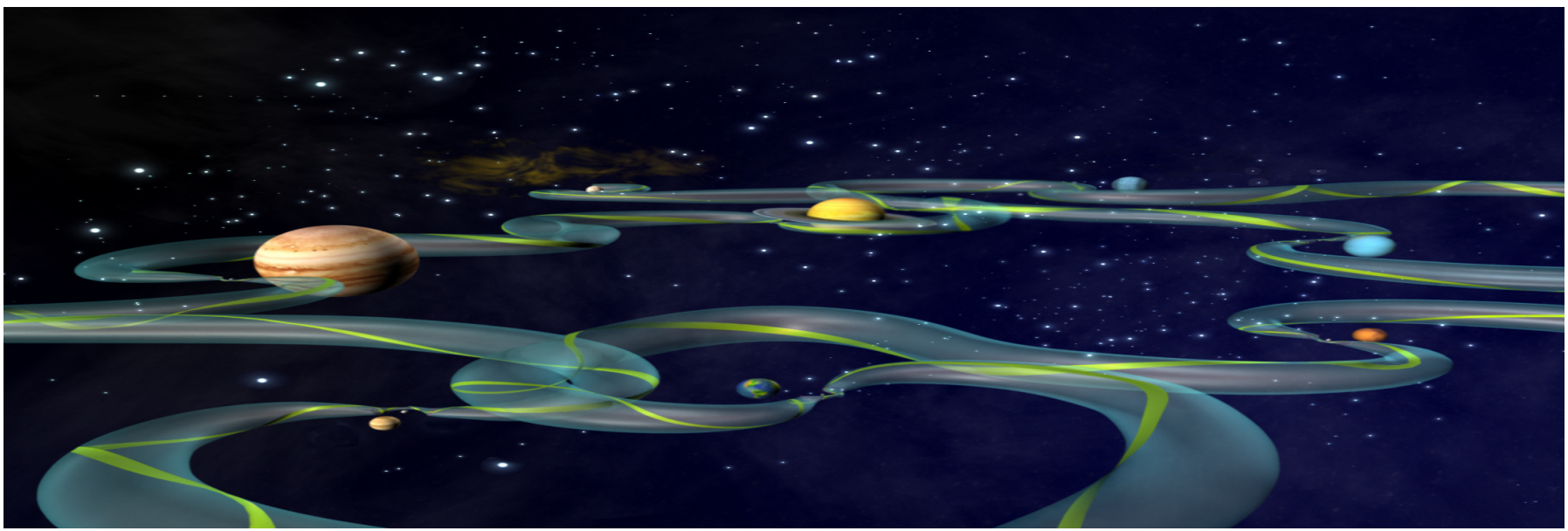


Active work:

- Add higher order perturbation effects to motion models (currently only earth oblateness is taken into account)
- Statistical orbit determination - connect probabilistic filter code to orbit determination module

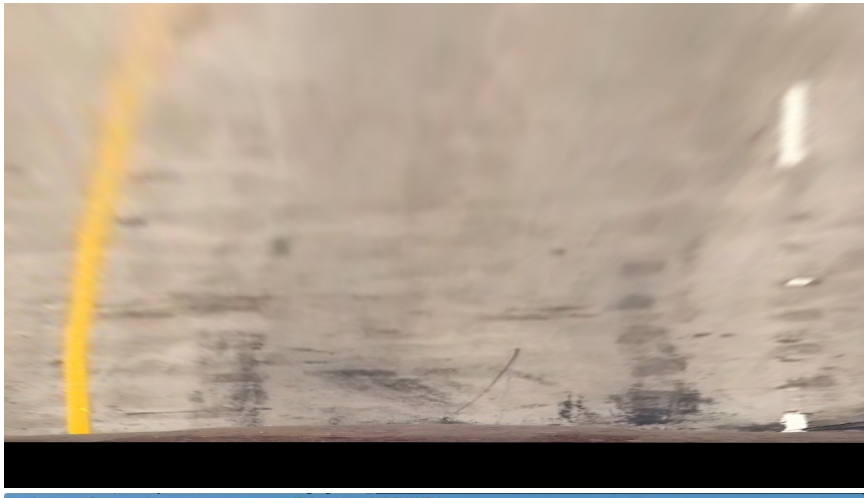
Related Theoretical Work - Invariant Manifold Theory

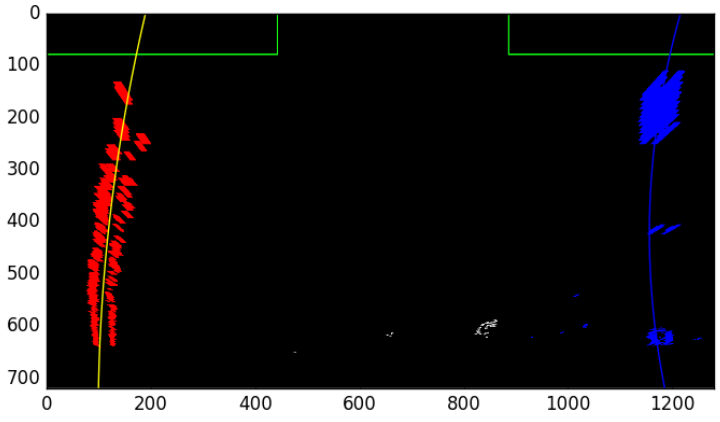
- Spectra of Functionalized Operators Arising from Hypersurfaces, ZAMP, (2014), (coauthors: Keith Promislow).
- Nonlinear Stability of Functionalized Flow (coauthors: Keith Promislow), expected. 2017.
- Main ideas: Understanding full nonlinear evolution in the state space given linearized motion near equilibrium structures.
- These ideas were pioneered in the orbital mechanics context by Martin Lo and the team at JPL to calculate paths near Lagrange points.



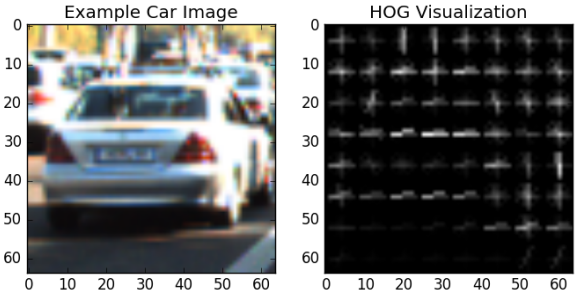
Source: From http://www.jpl.nasa.gov/releases/2002/release_2002_147.html

Computer Vision

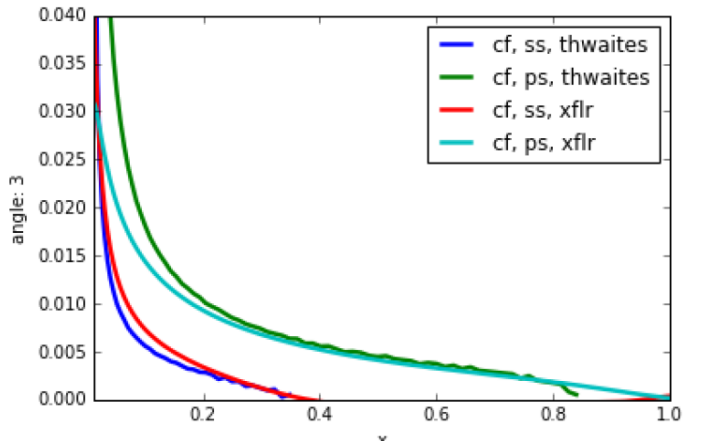


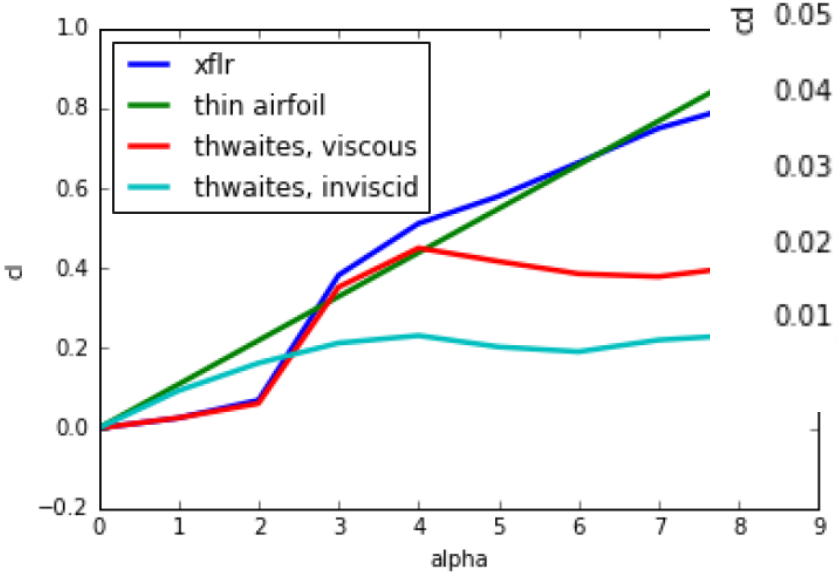


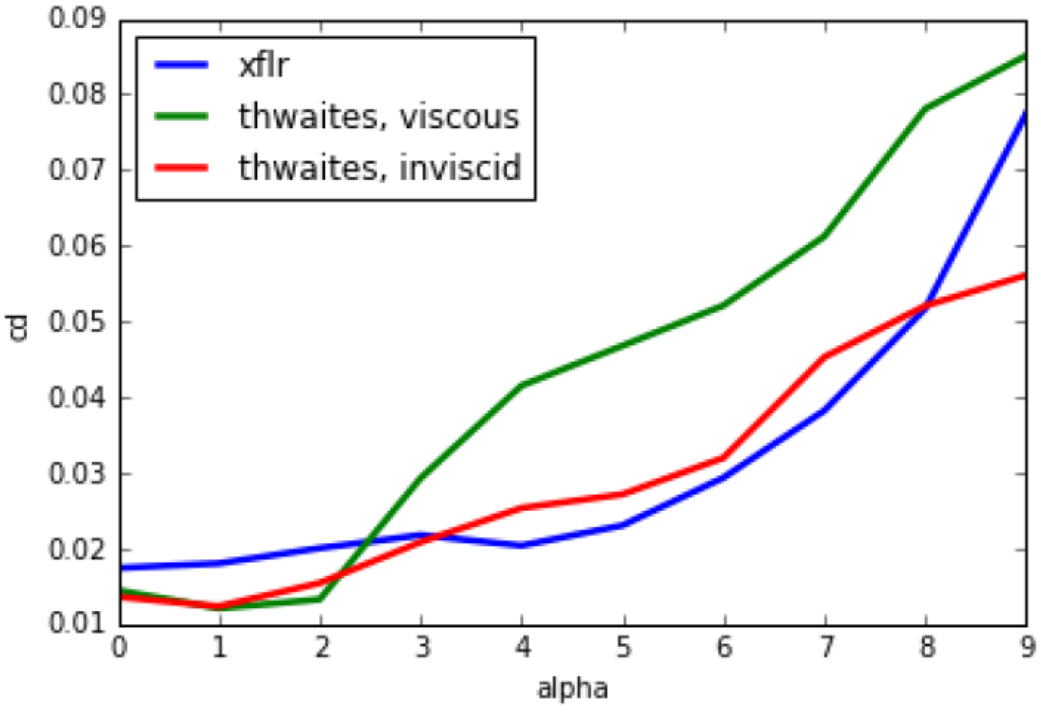
Vehicle Detection - Computer Vision and Machine Learning to Identify Vehicles



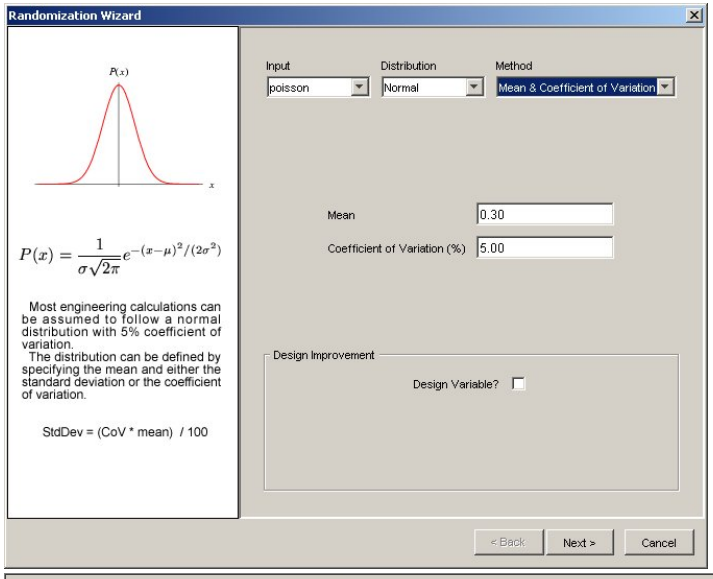
Aerodynamics - Python Code for Calculating Lift and Drag Coefficients for Airfoil using Thwaites' Method and Comparison to XFLR

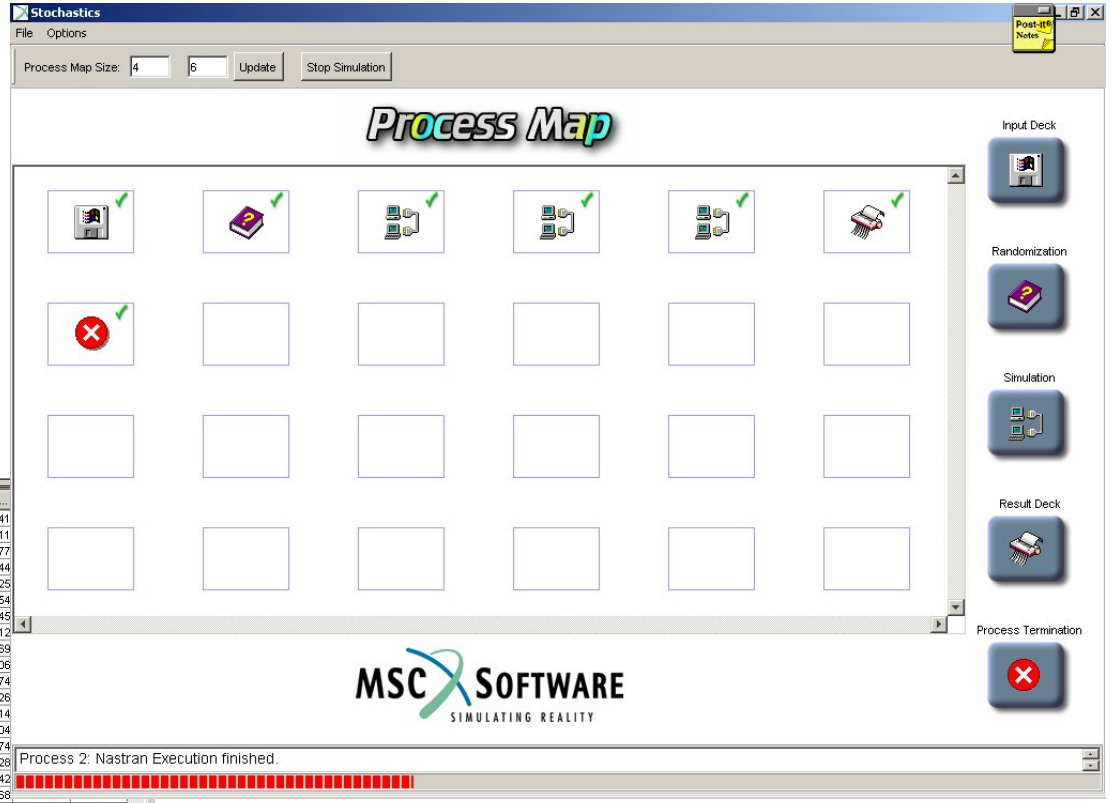


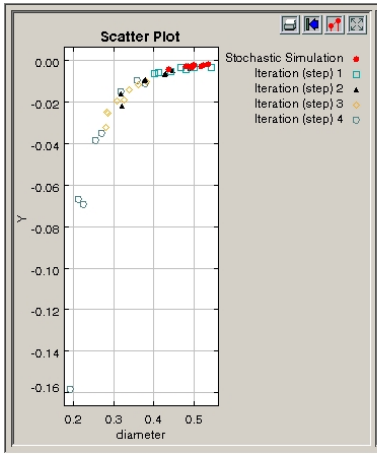




Stochastic Tool - Uncertainty Quantification Software for Engineering Design and Analysis







Input	Result	elem_num	poisson	modulus	bend_lo...
0.523	-0.003	10	0.298	30,837,4...	-99.441
0.497	-0.003	10	0.297	28,763,2...	-104.211
0.518	-0.003	10	0.309	29,050,0...	-99.277
0.5	-0.003	10	0.289	30,874,9...	-98.844
0.498	-0.003	10	0.311	29,274,5...	-103.425
0.479	-0.003	10	0.287	28,601,1...	-102.154
0.485	-0.003	10	0.306	28,514,3...	-97.545
0.48	-0.003	10	0.305	29,714,1...	-95.812
0.437	-0.004	10	0.309	31,267,5...	-98.369
0.536	-0.002	10	0.296	30,640,8...	-105.706
0.48	-0.004	10	0.306	30,976,2...	-93.474
0.412	-0.006	10	0.309	32,438,6...	-99.526
0.467	-0.004	10	0.296	30,398,8...	-104.914
0.401	-0.006	10	0.299	31,777,8...	-100.804
0.543	-0.003	10	0.286	27,937,8...	-107.174
0.5	-0.003	10	0.28	29,633,8...	-107.528
0.5	-0.003	10	0.298	27,029,4...	-109.442
0.444	-0.006	10	0.299	29,859,0...	-106.368
0.49	-0.004	10	0.324	27,313,5...	-107.309	0.49	1.973
0.448	-0.005	10	0.295	29,767,3...	-98.465	0.448	2.026
0.319	-0.016	10	0.29	31,077,0...	-93.493	0.319	2.014
0.427	-0.007	10	0.308	29,787,4...	-106.909	0.427	2.097
0.379	-0.009	10	0.3	31,800,5...	-100.454	0.379	2.076
0.43	-0.006	10	0.262	29,832,7...	-102.295	0.43	2.083
0.375	-0.01	10	0.266	29,117,9...	-98.588	0.375	2.018