

In the name of God

Department of Physics  
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STOCHASTIC PROCESSES

Exercise Set 9

(Due Date: 1401/03/17)

Every team of students (2 or 3 students), should select at least one of following question and try to do requested parts.

1. Cosmology: Based on paper arXiv:2009.07023, and according to Eq. (1), generate the results indicated in Fig. 1. Also derive the Fokker-Planck equation for probability density of region with mass between  $M$  and  $M = dM$ .
2. Astronomy: Based on paper A&A 494,287-294 (2009), assess the Markov properties of solar granular.
3. Rough surface: Based on arXiv:physics/0404015, examine the surface roughness as a Markov process.
4. Thermodynamics: Based on paper by Plastino, A. R., and A. Plastino. "Non-extensive statistical mechanics and generalized Fokker-Planck equation." *Physica A: Statistical Mechanics and its Applications* 222.1-4 (1995): 347-354, examine the stationary solution of non-linear Fokker-Planck equation.
5. Dynamical system with noise: Based on arXiv:nlin/0607002, examine the reconstruction of complex dynamical system with noise.

Good luck, Movahed

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