

# Poisson-Dirichlet Distribution with Small Mutation Rate

**Shui Feng** *McMaster University, Canada*, E-mail: shuifeng@mcmaster.ca

KEY WORDS: Poisson-Dirichlet distribution, Large Deviation, Phase Transition

MATHEMATICAL SUBJECT CLASSIFICATION:Primary:60F10;Secondary:92D10.

**Abstract:** The behavior of the Poisson-Dirichlet distribution with small mutation rate is studied through large deviations. The structure of the rate function indicates that the number of alleles is finite at the instant when mutation appears. The large deviation results are then used to study the asymptotic behavior of the homozygosity, and the Poisson-Dirichlet distribution with symmetric selection. The latter shows that several alleles can coexist when selection intensity goes to infinity in a particular way as the mutation rate approaches zero.

## References

- [1] D.A. Dawson and S. Feng (2006). Asymptotic behavior of Poisson-Dirichlet distribution for large mutation rate, *Ann. Appl. Probab*, **16**, 562-582.
- [2] S. Feng (2007). Large deviations associated with Poisson-Dirichlet distribution and Ewens sampling formula, *Ann. Appl. Probab*, **17**, 1570-1595.
- [3] S. Feng and F.Q. Gao (2008). Moderate deviations of Poisson-Dirichlet distribution, to appear in *Ann. Appl. Probab*.
- [4] S. Feng (2008). Poisson-Dirichlet distribution with small mutation rate, *preprint*.