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INTRODUCTION & AIM

Large deviations principle studies rare events and their asymptotic probabilities.

This work investigates:

- 1 sojourn time in an M/M/1 queue,
- 2 erroneous seconds in telecommunications systems.

The objective is to compare theoretical large deviation estimates with simulation results,

METHOD

For the empirical mean

$$M_n = \frac{1}{n} \sum_{i=1}^n X_i$$

Upper deviation:

$$P(M_n \geq \mu + \eta) \approx e^{-nI(\mu+\eta)}$$

Lower deviation:

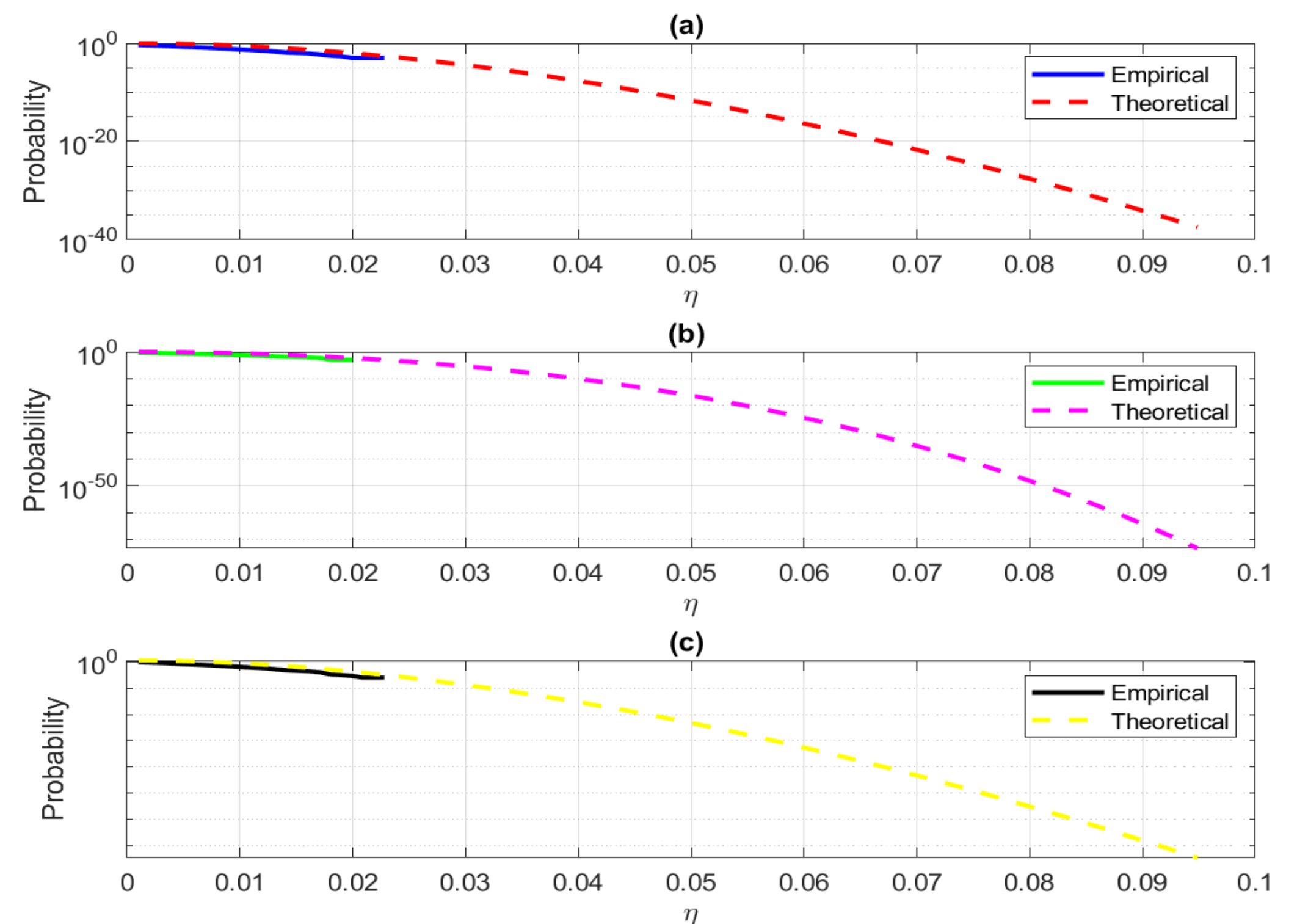
$$P(M_n \leq \mu - \eta) \approx e^{-nI(\mu-\eta)}$$

Bilateral deviation:

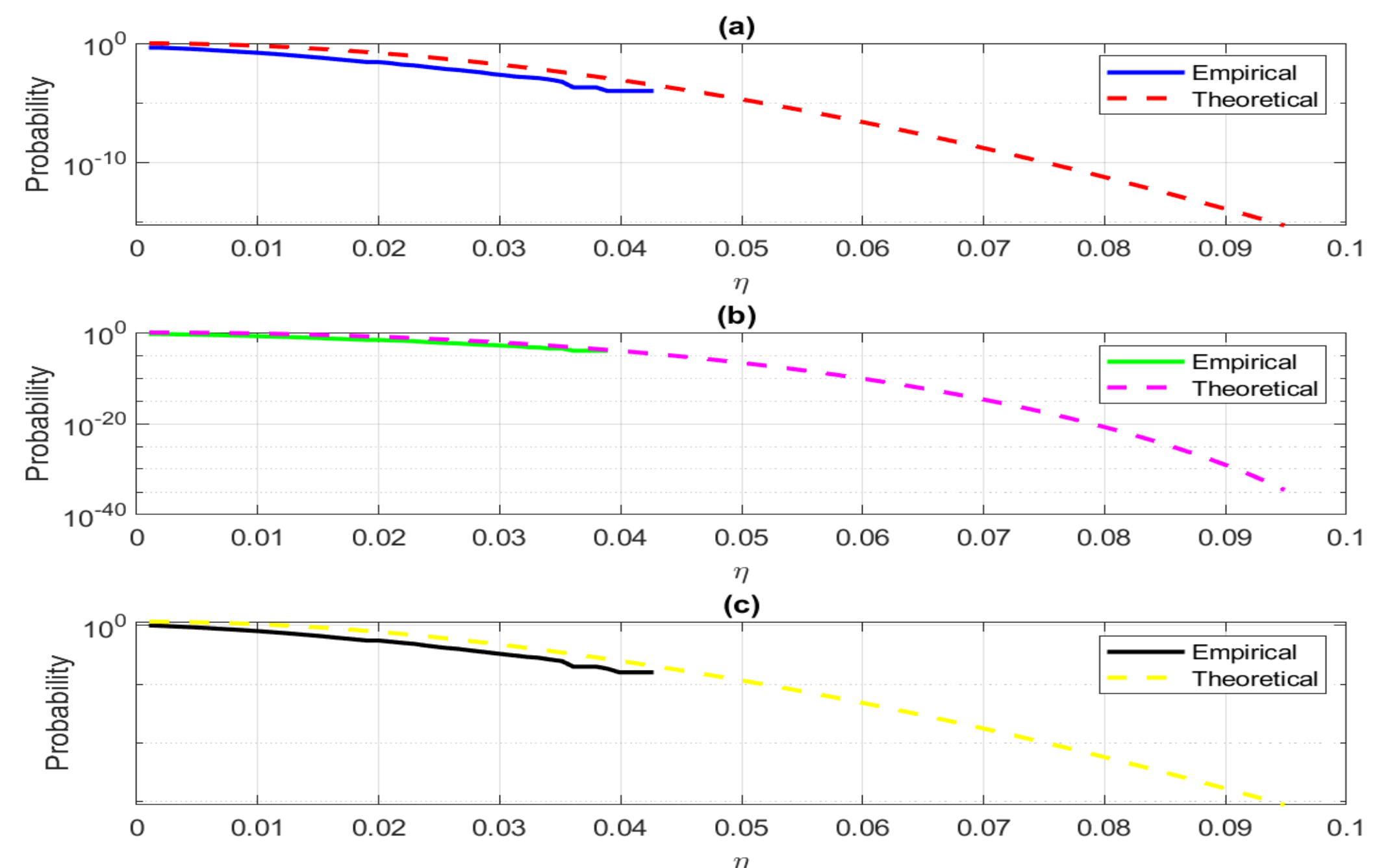
$$P(|M_n - \mu| = \eta) \approx e^{-nI(\mu-\eta)} + e^{-nI(\mu+\eta)}$$

RESULTS & DISCUSSION

Empirical vs Theoretical - n = 1000



Empirical vs Theoretical- n = 1000



CONCLUSION

The simulation results confirm the exponential decay predicted by theory for both the exponential and Poisson models.

FUTURE WRK / REFERENCES

A. Dembo and O. Zeitouni, Large Deviation Techniques and Applications, Springer, 1998.