

# MODEL AND SIMULATION OF BLACK DEATH

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The conditions and epidemic characteristics of 14th century Black Death allow modeling by means of one deterministic continuous SI model. The model of Noble [1] is modified to include the effects of the interaction between contagion and pendular population dislocations. The infective source term is modified to deal with the saturation of the contact rate. The diffusion flux of susceptible present in Noble is excluded from the present model, while the effects of economic and social crisis on mortality were included. The parameters of the mathematical model can be chosen either by estimation by simple models informed with empirical data or as the effect of optimization by comparison with the data of Christakos et al. [2]. The present model with the chosen parameterization leads to results in good agreement with the data of [2]. A detailed treatment and results may be found in [3].

## References

- [1] J. V. Noble. (1974). *Geographic and temporal developments of plagues*, Nature, **250**, 726–729.
- [2] G. Christakos, R.A. Olea, M.L. Serre, H.-L. Yu and L.-L. Wang. (2005). *Interdisciplinary Public Health Reasoning and Epidemic Modelling: The Case of Black Death*, Springer, New York.
- [3] O. Silva. (2016). *Black Death - model and simulation*, J. Comp. Science, **17**, 14–34.