Scaling of Cosine Correlations of Flight-delays in connected airports in American Aviation Networks

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Abstract

Flight-delays happen everywhere, everyday all over the world. However, studies on this topic from the view point of statistical physics is rarely seen. In this talk, we focus on flight-delay correlations between each pair of airports connected by direct flights. By rectifying big data of flight arrival/departure(A/D) record in America for 20 years, we calculate AA, AD, DA, DD-type of cosine correlations of delay time records in each pair of such airports for different periods: 3, 6, 9,..., 90 days, then we divide all the pairs into different groups according to average numbers of flights for 3 months. Rescaling all the curves of absolute correlation cosines over delay time, we get universal functions for 4 kinds of correlation types for every companies in USA. Double universal functions with the same set of exponents α and β are often found to appear, which imply duel dynamical equilibriums in air traffic operations.