

## Abstract

This work is a development on a previous EPL paper of KP Singh, R Kapri and S Sinha (2012) on the dynamics of a globally coupled system of multi-stable elements. In this work we have investigated the sensitivity of small world networks to heterogeneity. Specifically, we consider a network of bi-stable elements coupled to four neighbours under different connection topologies. We show that as global bias tends to 0? the network becomes hypersensitive to heterogeneity, even though the elements are connected to only a few other elements. Additionally we find that as the fraction of random links increases, the transition in the collective field gets sharper, for both static and dynamic links. Lastly, as we increase system size, we find again that the transition gets sharper. So it is evident that even a small coupling range, when randomized, can exhibit ultra-sensitivity to heterogeneity, similar to globally coupled systems.