

# Chimera and globally clustered chimera: Impact of time delay

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Following a short report of our preliminary results [Phys. Rev. E 79, 055203(R) (2009)], we present a more detailed study of the effects of coupling delay in diffusively coupled phase oscillator populations. We find that coupling delay induces chimera and globally clustered chimera (GCC) states in delay coupled populations. We show the existence of multi-clustered states that act as link between the chimera and the GCC states. A stable GCC state goes through a variety of GCC states, namely periodic, aperiodic, long-- and short--period breathers and becomes unstable GCC leading to global synchronization in the system, on increasing time delay. We provide numerical evidence and theoretical explanations for the above results and discuss possible applications of the observed phenomena.

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