# Modified extended active control for tracking control and synchronization of chaotic and hyperchaotic systems

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The active control which is outstanding for its robustness and ease of design has limitation on practical implementation partly due to the fact that the number of control functions, which is usually equal to the dimension of the system, are too many and the fact that its control signals are fixed and too large. In this paper a modified extended active control technique suitable for practical implementation is proposed. By applying the Lyapunov stability theory (LST) and the Rourth-Hurwitz criteria (RHC) to the extended active control technique, single active control functions are designed for the effective control and synchronization of chaotic and hyperchaotic systems. The single controller design, which could be achieved in different ways (via a manipulation of the LST and RHC, or a suitable choice of the control matrix, or a suitable choice of the control strength matrix) leads to a significant reduction in controller complexity. By varying the control strength matrix the control signal can be made as low as desired. The reduction in both controller complexity and the strength of the control signal in the proposed modified active control technique makes it suitable for practical implementation. Numerical result are provided for certain classes of chaotic and hyperchaotic systems to demonstrate the effectiveness of the technique.