Detection of the generalized synchronization of chaotic systems: auxiliary system approach with delayed communication

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The generalized synchronization is one of several kinds of synchronization of chaotic systems in the master-slave synchronization. This synchronization is established if a functional relation exists between states of both systems. However, finding this relationship is a difficult task; hence other means to detect the generalized synchronization were proposed, the auxiliary system approach is one of them. This approach is based on adding a copy of the slave system with different initial conditions and simultaneously observing the outputs of the slave and auxiliary systems. The indication of the established general synchronization is the existence of a relation between outputs of the auxiliary and slave systems that is easier to detect than any relation between states of two chaotic systems (as the definition of the generalized synchronization requires). We focus on applying the auxiliary system approach to detect the generalized synchronization under delayed communication between the master and slave systems. Attention will also be paid to the robustness of the proposed scheme against numerical errors.

Determination of the initial stress tensor from deformation of underground opening 1: theoretical background

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In this paper a method for the detection of the initial stress tensor is proposed. The method is based on measuring distances between some pairs of points located on the wall of underground opening in the excavation process. The methods is based on the solution of twelve auxiliary problems in the theory of elasticity with force boundary conditions. The positions of the pairs of points on the wall of underground openings are studied. The pairs must be located so that the condition number of the least square matrix has the minimal value, which guarantees a reliable estimation of initial stress tensor. In the paper the theoretical aspects of the method is studied.