

SYNCHRONIZATION OF CHEN SYSTEM BASED ON PASSIVITY TECHNIQUE FOR CDMA UNDERWATER COMMUNICATION

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ABSTRACT. *There exists an increasing demand for reliable, high capacity underwater acoustic networks (UANS), as evidenced by the large volume of research invested over the last decade in overcoming the difficulties inherent with propagation of information bearing signals through shallow water regions. In this paper, we investigate the problem synchronization of chen system based on passivity technique for Code Division Multiple Access (CDMA) underwater communication in order to minimize interference (MAI) caused by the multiple access by using Chen system for spreading sequence, assure the transmitter-receiver synchronization and secure the transmission information. The numerical result presented show that system is quickly and perfectly synchronized with the proposed method.*

Keywords: Underwater acoustic network, Passivity, Chen system, CDMA and control synchronization

1. Introduction. The shallow-water acoustic channel is an exceptionally difficult transmission medium that challenges the communications methods available today. The principal difficulties arise from multipath interference due to low-attenuated bottom and surface reflections associated with small grazing angles. These cause both long time-delay spread and large multipath amplitudes to be present in the received signal [1].

DIRECT-SEQUENCE Code-Division-Multiple-Access (DS-CDMA) is a spread-spectrum (SS) technique that is often utilized to achieve multiple access communication. To be categorized as SS, a communications system must employ a transmission bandwidth that is considerably greater than the information rate. Utilization of bandwidth in this manner introduces a multiplicity of benefits, such as immunity against multipath and multiple access interference suppression capability. However, the main advantage of DS-CDMA, particularly for underwater acoustic networks, is the support of asynchronous communications [2,3]. Recently, the flourishing development and use of DS-CDMA in cellular-radio