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Chaos Synchronization and Communication using Optoelectronic Time-Delay Feedback Circuits CHRISTOPHER MAY, LUCAS ILLING, Reed College, Portland, OR — We investigate experimentally a chaos communication scheme that is based on the synchronization of two optoelectronic circuits. Oscillations with frequencies of up to 10 GHz are generated in a single circuit by means of time-delayed and amplified feedback to a laser-pumped optoelectronic Mach-Zehnder modulator that serves as the nonlinearity. By varying the pump-laser power the device dynamics can be tuned from simple periodic to highly chaotic oscillations. Synchronization is achieved by unidirectionally coupling two circuits via a fiber-optic link and by matching them through fine-tuning the pump-laser powers and Mach-Zehnder bias voltages. Using these synchronized optoelectronic circuits we demonstrate communication by adding a message signal to the transmitter and successfully retrieving it from the chaotic carrier signal at the receiver.

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