Autaptic Circuits of Integrated Laser Neurons

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3. Results

We performed two experiments to test the characteristics of an autapse of an integrated laser neuron. In the first experiment, we showed the self-sustained spike train can be generated (Fig. 2(a–h)). In order to stabilize the pulse train in time such that we can collect it by the sampling scope, the condition $T = nt$ is required, where n 2 N, and t is the delay time of feedback loop. In Fig. 2(b), (d), (f), (h), each spike in a period is separated by t 249 ns, which indicates that it is triggered by the feedback perturbation rather than external input pulses. The result of self-sustained spike train demonstrates that the information of the neuron is cascadable and can be processed in the network. This *cascadability* is an important and necessary condition of a neuron to form of a network system. In the second experiment, we tested the effect of feedback strength of the autaptic circuit by appling different pump currents of the EDFA connected to the output signal. As shown in Fig. 2(j–l), when the strength is not strong enough, the output spikes maymaym8aion of d1youtput wi1