Network system engineering by controlling the chaotic signals using silicon micro ring resonator

Abstract:

We investigate nonlinear behaviors of light known as bifurcation and chaos within a nonlinear silicon microring resonator (SMRR). The research is used to controlling SMRR's behaviors such as chaos applicable in security coding systems. The variable parameters affect the bifurcation to be happened in smaller roundtrip among total round trip of 20000 or input power. Simulated Results show that rising of the nonlinear refractive indices, coupling coefficients and radius of the SMRR leads to descending in input power and round trips wherein the bifurcation occurs. As result, bifurcation or chaos behaviors are seen at lower input power of 44 W, where the nonlinear refractive index is n 2=3.2×10 -20 m 2/W. Smallest round trips of 4770 and 5720 can be seen for the R=40 µm and ? = 0.1 respectively. The controlled chaotic signals from the SMRR are passing through a polarizer beam splitter to generate quantum binary codes which are used in wireless network communication.