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标题: Pattern effects of modulated optical signals in ultra-high bit rate all-optical signal processing with a quantum dot semiconductor optical amplifier
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摘要: Investigation into optical pattern effects at ultra-high speed all-optical signal processing in a quantum dot (QD) semiconductor optical amplifier is presented by numerical modeling of nonlinear QD carrier dynamics. In a control-probe scheme, modulation properties of continuous probe light are examined under the propagation of a train of the sub-picosecond control (data) pulses of random bits at ultra-high repetition rates (data processing bandwidths) that range from 200 GHz to a few THz. Various optoelectronic parameters such as the pulse width, the pulse energy, the data processing bandwidth, and the injection current are varied to examine the properties of modulation and pattern effects, to provide those properties as functions of such parameters with the discussion using the time-dependent nonlinear gain dynamics at the ultra-high bandwidths, for processing parameter optimization. The parameter dependence of those properties, which is revealed to rely on the other parameter condition, follows the non-simple behavior, which may not be estimated without scanning the relevant parameters nor simply by nonlinear gain dynamics under the propagation of a single data pulse. (C) 2012 Society of Photo-Optical Instrumentation Engineers (SPIE). [DOI: 10.1117/1.OE.51.4.045005]
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