

标题: Photonic generation of high-frequency microwave signals utilizing a multi-transverse-mode vertical-cavity surface-emitting laser subject to two-frequency orthogonal optical injection

作者: Quirce, A (Quirce, Ana); Valle, A (Valle, Angel); Lin, H (Lin, Hong); Pierce, DW (Pierce, David W.); Zhang, Y (Zhang, Yu)

来源出版物: JOURNAL OF THE OPTICAL SOCIETY OF AMERICA B-OPTICAL PHYSICS

卷: 29 期: 12 页: 3259-3270 出版年: DEC 2012

在 Web of Science 中的被引频次: 0

被引频次合计: 0

引用的参考文献数: 38

摘要: We study photonic microwave signal generation obtained when single- and multi-transverse-mode vertical-cavity surface-emitting lasers (VCSELs) are subject to two-frequency orthogonal optical injection. Our calculations show that broadly tunable microwave signals can be obtained in these systems. The response of the multi-transverse-mode VCSEL is enhanced with respect to that obtained with a similar single-transverse-mode VCSEL subject to the same two-frequency orthogonal optical injection. The extra degree of freedom given by the multi-transverse-mode operation of the VCSEL under two-frequency orthogonal optical injection enhances the performance of the photonic microwave generation system, because the higher-order transverse mode is excited with a much larger amplitude than that of the fundamental transverse mode. Periodic oscillations are obtained for a very wide range of frequency detunings between the optical injections and transverse modes. A relative maximum of the microwave signal amplitude is obtained when the frequency of one of the optical injections is very close to the frequency of the orthogonally polarized fundamental mode of the VCSEL. Periodic oscillations are demonstrated for symmetric and asymmetric values of the injection strengths. Wide tuning ranges, extended into the THz band, are obtained in our system. Our results show that the proposed microwave signal generation mechanism is independent of the polarization of the master lasers. (c) 2012 Optical Society of America

入藏号: WOS:000311990300008

语种: English

文献类型: Article

KeyWords Plus: RELATIVE INTENSITY NOISE; PERIOD-ONE OSCILLATION; SEMICONDUCTOR-LASER; POLARIZATION BISTABILITY; DYNAMICS; LOCKING; VCSELS; SELECTION

地址: [Quirce, Ana; Valle, Angel] Univ Cantabria, Inst Fis Cantabria, CSIC, E-39005 Santander, Spain

[Quirce, Ana] Univ Cantabria, Dept Fis Moderna, E-39005 Santander, Spain

[Lin, Hong; Pierce, David W.; Zhang, Yu] Bates Coll, Dept Phys & Astron, Lewiston, ME 04240 USA

通讯作者地址: Valle, A (通讯作者), Univ Cantabria, Inst Fis Cantabria, CSIC, Avda Los Castros S-N, E-39005 Santander, Spain.

电子邮件地址: valle@ifca.unican.es

出版商: OPTICAL SOC AMER

出版商地址: 2010 MASSACHUSETTS AVE NW, WASHINGTON, DC 20036 USA

Web of Science 类别: Optics

研究方向: Optics

IDS 号: 049NR

ISSN: 0740-3224

29 字符的来源出版物名称缩写: J OPT SOC AM B

ISO 来源出版物缩写: J. Opt. Soc. Am. B-Opt. Phys.

来源出版物页码计数: 12