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Critical Slowing Down of Relaxation Time in VCSEL's Polarization Switching YUEH-CHEN LI, WANG-CHUANG KUO, YU-HENG WU, TSU-CHIANG YEN, Department of Physics, National Sun Yat-sen University —
This study investigates the polarization switching (PS) of vertical-cavity surface-emitting lasers (VCSELs) approaching to criticality. The dynamical bifurcation of VCSEL's PS (VPS) which was researched in earlier investigations essentially differs from the static cases typically presented in thermodynamics. Therefore, a VCSEL is driven by quasi-increasing step current and quasi-decreasing step current instead of alternating current in this study. The results show a critical slowing down nearing PS, a power law and scaling law of the relaxation time which are the characteristics of second order phase transition. This investigation has potential for connecting the phase transition characteristics of VPS and quantum phase transitions (QPTs).

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