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【176】Rf modulation of surface-emitting mid-IR ring DFB Quantum Cascade Lasers

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The fast modulation characteristics of quantum cascade lasers (QCLs) up to the MHz-/GHz-range give insight into their dynamical properties and act as a prerequisite for QCL-based experiments like e.g. the injection locking of mid-infrared frequency combs, spectroscopic measurements or high data transmission optical free-space telecommunication applications. In this paper we present the first analysis of the optical high-frequency modulation characteristics of surface-emitting mid-IR DFB-*ring* QCLs up to 160 MHz. We compare them to DFB-*ridge* QCLs from the same gain material and show the existence of the (quasi) single-sideband ((q)SSB) regime, a special FM-state in QCLs, not present in regular diode lasers.
Surface-emitting ring-QCLs are particularly relevant, since they show significant potential in array integration and monolithic (ring-in-ring) laser-detector schemes.

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