Microcavity Laser Diode Model

-Application to surface relief VCSEL
Microcavity model

- Rigorous solution of Maxwell wave equation with no need to separate lateral and longitudinal modes.

- Arbitrary FEM mesh structure.

- PML boundary to define power exit.

- Coupling to optical gain and drift-diffusion models to achieve full self-consistency.

- Multicavity eigen mode solution with multiple wavelength operation.

- Perfect tools for surface relief VCSEL simulation where longitudinal/lateral mode coupling determines modal behavior.
FEM Structure

Surface relief (SR) VCSEL
All-mode wave intensity
Comparison with ref. wo SR

Top surface near field pattern from all -mode power intensities.

All -mode emission power vs. current.

From all mode power intensities.
Summary

- A technical breakthrough for microcavity laser diode simulation.

- Accurate prediction for wavelength, near-field pattern, far-field pattern as well as thermal-electrical behavior.

- Highly efficient computation with use of high performance GPU acceleration.