Microcavity Laser Diode Model

-Application to surface relief VCSEL

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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.

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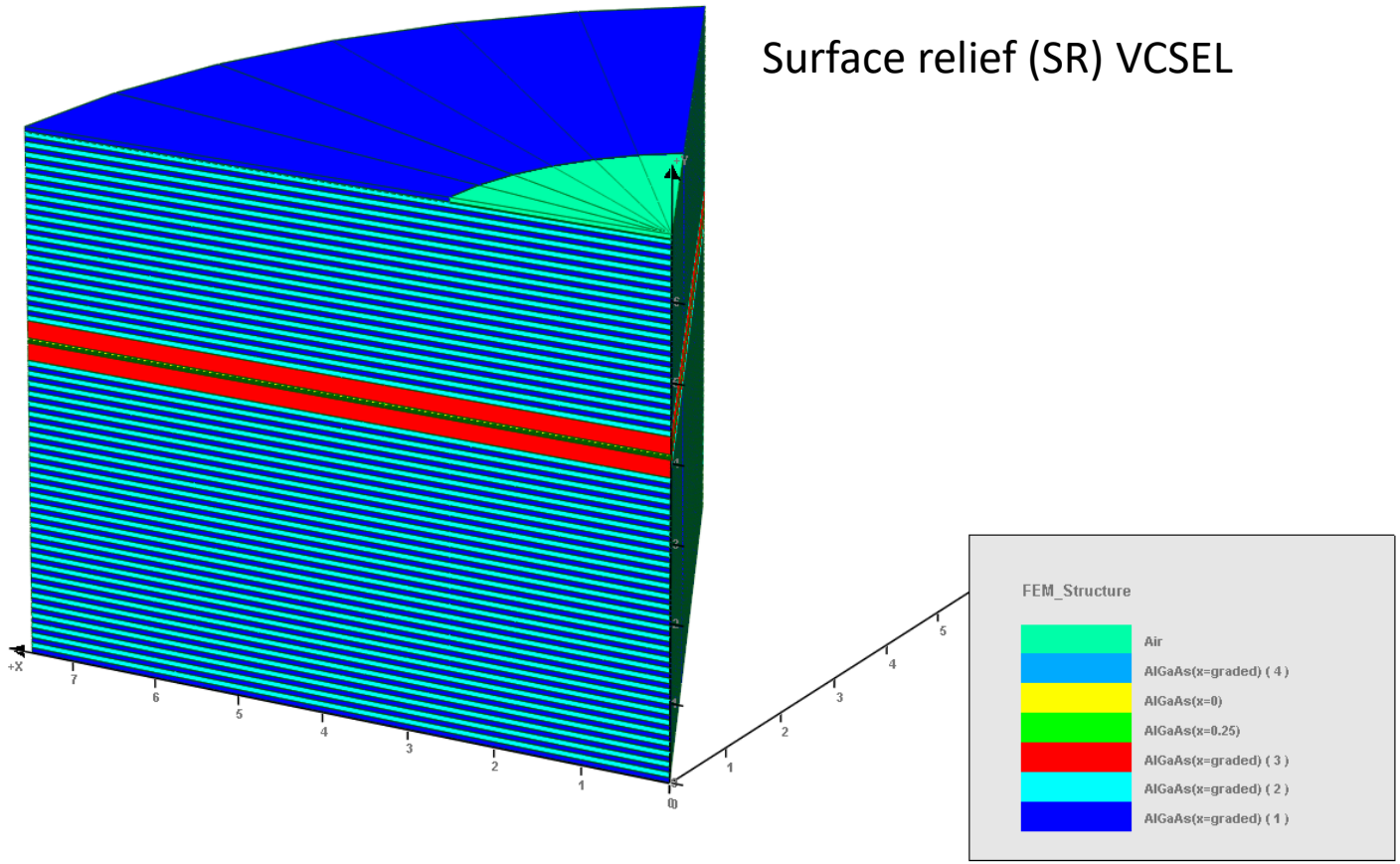
FEM Structure

Surface relief (SR) VCSEL



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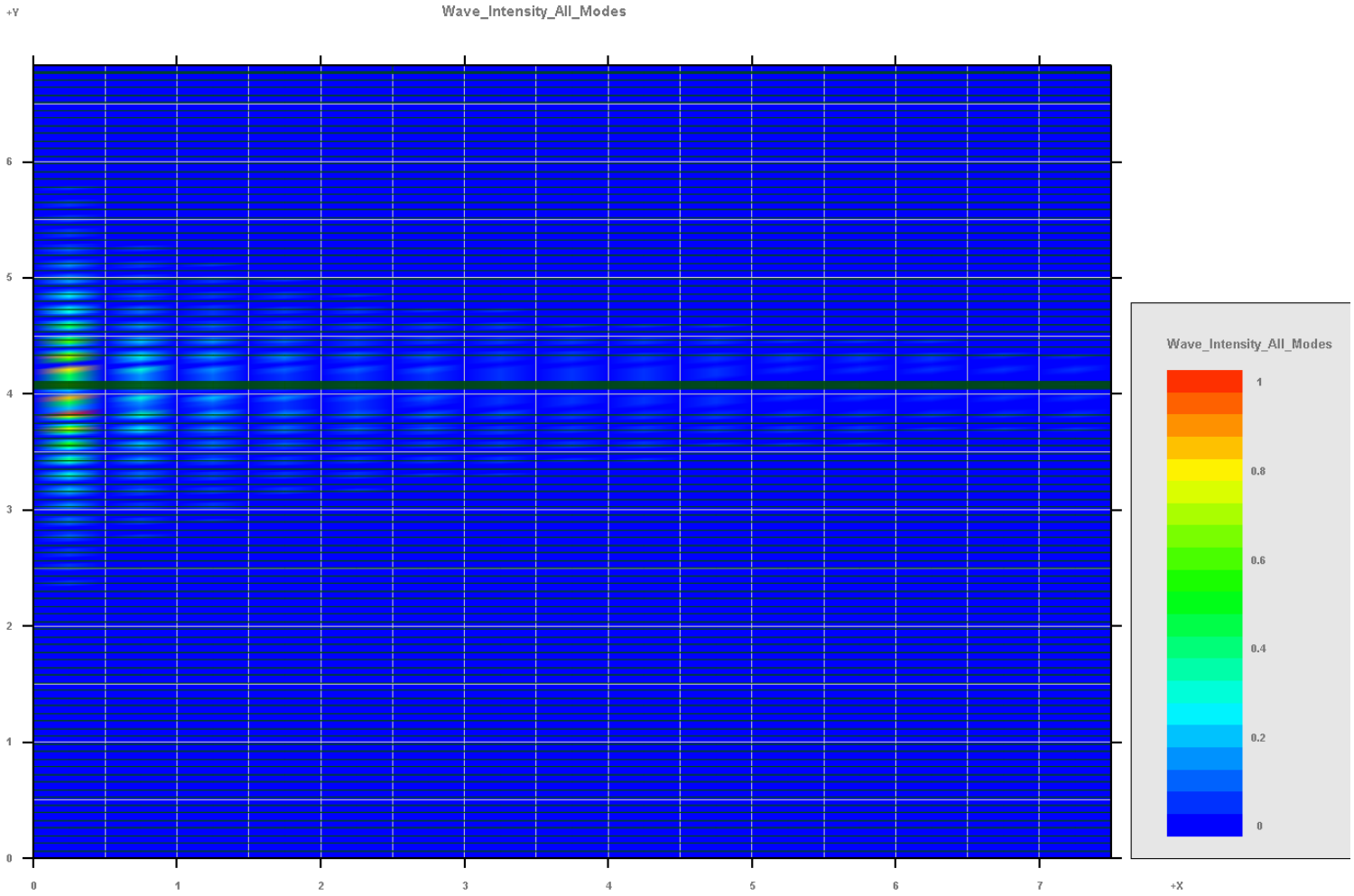
All-mode wave intensity



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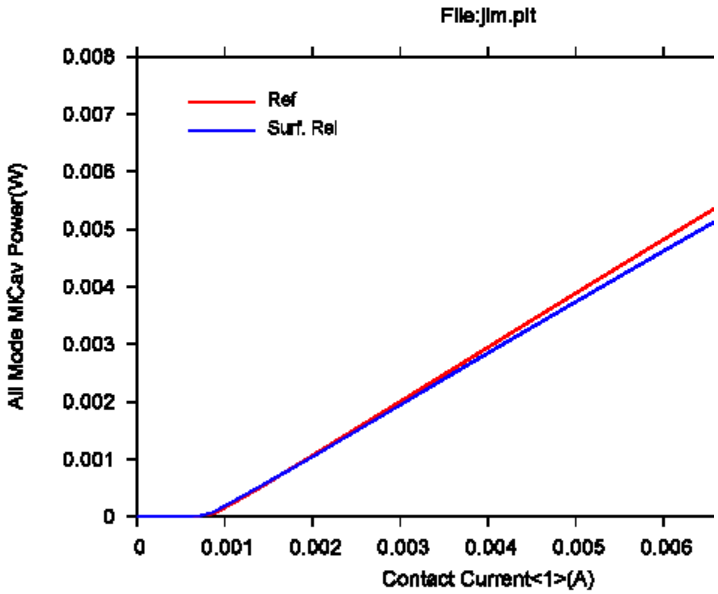
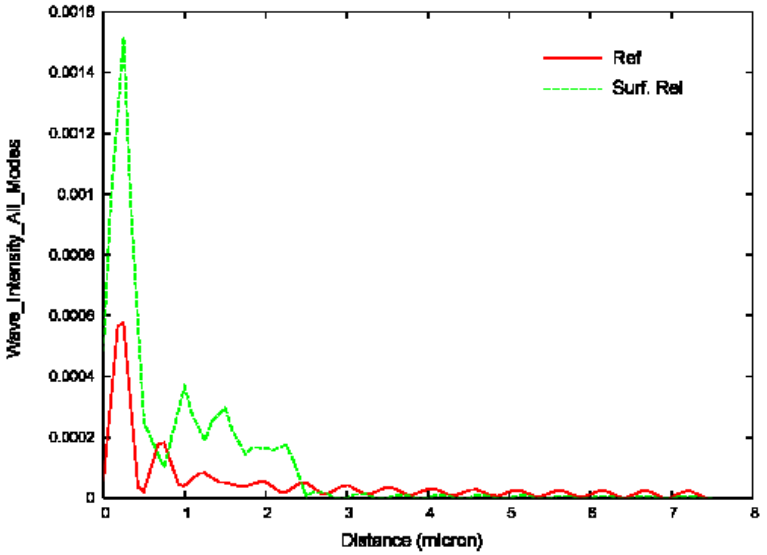


current.



intensities.

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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.

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