Degenerate Distributed Feedback (DDFB) Laser

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OTHER INFORMATION

CATEGORIZED AS

- **Communications**
  - Internet
  - Networking
  - Optical
- **Security and Defense**
  - Other
- **Sensors & Instrumentation**
  - Other

RELATED CASES

2023-789-0

BRIEF DESCRIPTION

The DDFB laser introduces a novel feedback mechanism for enhanced frequency selectivity and stability in laser oscillation.

FULL DESCRIPTION

The DDFB laser is a revolutionary advancement in laser technology, utilizing a dual grating structure to support four degenerate modes, offering stronger feedback and improved frequency selectivity compared to traditional DFB lasers. This innovative approach allows for single-mode lasing and higher efficiency, overcoming the limitations of conventional DFB lasers.

SUGGESTED USES

- Optical fiber telecommunications
- Wide band optical communications
- Coherent communications systems
- LIDAR technology
- RF photonics
- Precision metrology
- Quantum technologies
- Spectroscopy and sensing application

ADVANTAGES

- Enhanced frequency selectivity and stability
- Single-mode lasing with higher efficiency
- Improved resistance to changes in intensity and phase due to spontaneous photon injection
- More stable operation with respect to cavity terminations and environmental variations
- Eliminates the need for defects within the cavity for stability, unlike DFB lasers
- Greater amplitude sensitivity to some modulation effects, facilitating easier optical light modulation
- Lower lasing threshold and narrower linewidth compared to conventional DFB lasers

PATENT STATUS

Patent Pending

RELATED MATERIALS

- T. Mealy and F. Capolino, "Degenerate Distributed Feedback Photonic Structure With Two Gratings Exhibiting Degenerate Band Edge," in IEEE Photonics Technology Letters, vol. 35, no. 4, pp. 187-190, 15 Feb.15, 2023, doi: 10.1109/LPT.2022.3215661

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