

光注入形ファイバレーザのコヒーレント光通信適用への基礎的研究

著者	林 健一
著者別表示	Hayashi Kenichi
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A Study on Applications of Optical Fiber Lasers for Coherent Optical Communications

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情報通信工学

Research Institution

Kanazawa University

Principal Investigator

HAYASHI Ken-ichi Kanazawa University, Faculty of Engineering, Professor, 工学部, 教授 (00019754)

Co-Investigator(Kenkyū-buntansha)

IYAMA Koichi Kanazawa University, Graduate School of Natural Science and Technology, Research, 大学院・自然科学研究科, 助手 (90202837)

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Er-Doped Optical Fiber / Fiber Ring Laser / Optical Fiber Loop / Slope Efficiency / Spectral Linewidth / Fiber Ring Filter / Injection-Locked Ring Laser

Research Abstract

We constituted two types of optical fiber ring lasers using Er-doped optical fibers (a low and a high Er-doping concentration), which were pumped 980nm or 1480nm semiconductor laser diodes via a WDM optical fiber coupler, and measured the characteristics of the laser outputs, the lasing wavelengths, and the wavelength tuning. The laser outputs were obtained through an optical fiber coupler of which the coupling ratio was variable.

In case of the low concentration, the Er-doped fiber length was 23.0m, the loop length 30.8m, and the concentration-length product 115.kppmm. When pumping power was 35mW and 56.7% coupling ratio, the maximum lasing output was 2.4mW. When the coupling ratio was 68.0%, the maximum slope efficiency was 8.9%. And the lasing spectral linewidth was measured as 3kHz using a 80km-ring version delayd self heterodyne method. In the high concentration having the same concentration-length product of the low case, the maximum lasing output was 2.1mW at 35mW pumping and 77.3% coupling, the maximum slope efficiency was 9.1% at 88.8% coupling, and the lasing spectral linewidth was 5kHz. We also investigated an injection-locked fiber ring laser which was optically injected from a semiconductor laser diode. Resultingly, it was found that an extremely narrow linewidth of the master laser was needed for stable locked oscillations. In addition, we studied on use of out ring fiber confirulation as a ring fiber filter which acted as a pumping-power-controlable bandpass filter.

Research Products (6 results)

All Other

All Publications (6 results)

- [Publications] Koichi Iiyama: "Frequency Domain Detection of Coherence Multiplexed Sensor Signal by Using an Optical Loop with a Frequency Shifter" The Fourth Sino-Japanese Joint Meeting on Optical Fiber Science and Electromagnetic Theory. 1. 224-229 (1993) ▼
- [Publications] 永田英儀: "Erドープ光ファイバリングレーザの発振特性の帰還率依存性" 電子情報通信学会レーザ・量子エレクトロニクス研究会資料. LQE-13. 73-77 (1994) ▼
- [Publications] Xiapqun Zhou: "Detection Scheme of Coherence-Multiplexed Sensor Signal Using an Optical Loop with a Frequency Shifter:Sensitivity Enhancement" IEEE Photonics Technology Letters. 6. 767-769 (1994) ▼
- [Publications] Koich Iiyama: "Frequency Domain Detection of Coherence Multiplexed Sensor Signal by Using an Optical Loop with a Frequency Shifter" The Fourth Sino-Japanese Joint Meeting on Optical Fiber Science and Electromagnetic Theory. 224-229 (1993) ▼
- [Publications] Hideki Narata: "Dependence on Feedback Ratio of Oscillation Characteristics of Er-Doped Fiber Ring Lasers" Technical Report of IEICE. LQE-13. 73-77 (1994) ▼
- [Publications] Xiaoqun Zhou: "Detection Scheme of Coherence-Multiplexed Sensor Signal Using an Optical Loop with a Frequency Shifter : Sensitivity Enhancement" IEEE Photonics Technology Letters. Vol.6, No.6. 767-769 (1994) ▼

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