東北大学 電気通信研究所

研究室外部評価 参考資料

(2013 年度-2018 年度)

Research Laboratory Reference Data for External Review

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Research Institute of Electrical Communication
Tohoku University

超高速光通信研究室

Ultrahigh-Speed Optical Communication

1. 研究成果 / Research Achievements

(1) 査読付学術論文 / Refereed journal papers

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[21] M. Nakazawa, "The EDFA odyssey," Symposium on Glass Science and Technologies, Plenary talk, November 2016.

[22] M. Nakazawa, “Mode-locked lasers and their spectral manipulation for ultra-high speed pulse transmission,” OFC 2017 Workshop, March 2017.

[23] M. Yoshida, K. Kasai, T. Hirooka, and M. Nakazawa, "Ultramulti-level transmission in multi-core fiber," EXAT 2017, Invited talk, F2.2, June 2017.

[24] M. Nakazawa, “Progress on 3M Communication Systems,” ISUPT 2017, Invited talk, July 2017.

[25] T. Hirooka, “PMD issues in Nyquist transmission,” ISUPT 2017, Invited talk, July 2017.

[26] M. Nakazawa, “Invention Of LD-pumped EDFA And Their Applications From Soliton To Coherent Nyquist Pulse Transmission, CLEO-PR 2017, Invited talk, 1-3F-2, August 2017.

[27] M. Nakazawa, “Recent Progress on Ultra-High Capacity Optical Transmission using Multi-Level, Multi-Core, and Multi-Mode Techniques,” ICO-24, Invited talk, Tu2E-01, August 2017.

[28] M. Yoshida, “Recent progress in multi-level modulation,” Special ECOC 2017 Symposium, Invited talk, September 2017.

[29] M. Nakazawa, "The EDFA odyssey from optical soliton to coherent Nyquist pulse," ISPOC 2017, Special invited talk, October 2017.

[30] K. Kasai, M. Yoshida, T. Hirooka, and M. Nakazawa, “Injection-locked Homodyne Detection for Higher-order QAM Transmission,” OFC 2018, Invited talk, M4G.1, March (2018).

[31] M. Nakazawa, M. Yoshida, and T. Hirano, “Secure Transmission using QAM Quantum Noise Stream Cipher with Continuous Variable QKD,” OFC 2018, Invited talk, Th3E.2 March (2018).

2. 学会活動 / Activities in academic societies

(1) 学会役員等の活動 / Activities on committees of academic societies

中沢正隆

[1] 電子情報通信学会超高速光エレクトロニクス研究委員会 委員（1990 年－現在）
[2] 応用物理学会・光・量子エレクトロニクス業績賞 選考委員（1999 年－現在）
[3] 電子情報通信学会 副会長 (2015~2017)
[4] Board of Governors, IEEE Photonics Society (2013~2015)
[5] Chair of IEEE Sendai Section (2016~2017)
[6] 電子情報通信学会 次期会長(2018)

廣岡俊彦

[1] 電子情報通信学会 光通信インフラの飛躍的な高度化に関する特別研究専門委員会 専門委員 (2010~現在)
[2] 電子情報通信学会 光ファイバ応用技術研究会 専門委員（2012~2017）
[3] 電子情報通信学会 光通信システム研究会 専門委員(2014~現在)
[4] 電子情報通信学会東北支部 会計幹事(2017~2018)

吉田真人

[1] 電子情報通信学会　光通信システム研究専門委員会　専門委員（2008 年 4 月～2014 年 3 月）
[2] 電子情報通信学会　超高速光エレクトロニクス研究専門委員会　専門委員（2017 年 3 月～継続中）
[3] 電子情報通信学会　光ファイバ応用技術研究専門委員会　専門委員（2017 年 4 月～継続中）
[4] 電子情報通信学会東北支部　会計幹事（2018 年 6 月～継続中）

葛西恵介

[1] レーザー学会 ファイバーレーザー技術専門委員会 専門委員 (2012 年 4 月～ 継続中)
[2] 電子情報通信学会　レーザ・量子エレクトロニクス研究専門委員会 委員 (2018 年 6 月～継続中)
[3] 電子情報通信学会ソサイエティ大会 エレクトロニクスソサイエティ プログラム編成委員 (2018 年 7 月～2018 年 9 月)
[4] 電子情報通信学会ソサイエティ大会　企画シンポジウムオーガナイザ (2019 年 1 月～2019 年 9 月)

(2) 学術的国際会議の企画・運営 / Planning and organizing academic international conferences.

[1] ISUPT International Advisory（中沢正隆）
[2] OFC Program subcommittee member (廣岡俊彦, 2016~2018)
[3] ECOC Program subcommittee member (廣岡俊彦, 2014~2018)
[4] OECC Program subcommittee member (廣岡俊彦, 2012~2017)

(3) 学術論文誌の編集・査読 / Editor and reviewer for academic journals.

[1] 電子情報通信学会 会誌編集委員会 委員 (葛西恵介, 2018 年~)
[2] 論文誌査読(Optics Express, IEEE Photonics Technology Letters, Journal of Lightwave Technology, IEICE Electronics Express, 他)

3. **社会貢献** / Contributions to society

(1) **国・地方自治体・公共団体における活動**

Activities for national and local governments, and public organizations

中沢正隆

[1] 光産業技術振興協会(OITDA)ロードマップ委員会 副委員長（1999 年－現在）

[2] 日本学術振興会・フォトニック情報システムに関する先導的研究開発委員会 委員（2004 年－現在）

[3] 科学技術振興事業団・井上春成賞 推薦委員（2005 年－現在）

[4] 日本学術会議 連携会員 (2006~現在)

[5] 東レ科学振興会・東レ科学技術賞 推薦委員（2006 年－現在）

(2) **アウトリーチ活動** / Outreach activities

中沢正隆

[1] 電気学会 125 周年特別講演会「エクサビット情報社会の実現に向けた光通信技術の新たな挑戦」(2013.10.11)

[2] 金沢大学シンポジウム「エルビウムドープ光ファイバ増幅器の実現と最近の光通信」(2014.1.10)

[3] 科学者の卵養成講座「世界を結ぶインターネットを可能にした光ファイバー通信～光通信はどこまで速く、大容量になるの～」(2014.2.8)

[4] 豊橋技術科学大学テーラーメイド・バトンゾーン講義「世界を結ぶインターネットを可能にした光ファイバ通信とその将来展望」(2014.5.22)

[5] Agilent Measurement Forum 2014「光通信の高度化に関する最近の展開」(2014.6.18)

[6] 東北みらいプロジェクトレクチャーシリーズ「光技術 革新と進化がもたらす社会」(2015.1.31)

[7] 理化学研究所第 27 回 APSA/RAP セミナー「エクサビット情報社会に向けた光通信の新たなる挑戦－超多値コヒーレント伝送、マルチコアファイバ、マルチモード制御を中心に－」October (2015).

[8] ノーベル賞受賞者フォーラム福島セッション「次世代へのメッセージ」“光通信技術の最前線”, May (2015).

[9] フォトニックネットワークシンポジウム 2016「10 テラビット/秒/チャンネルデジタルコヒーレント光伝送への挑戦」February (2016).

[10] 第 100 回サイテックサロン「エクサビット情報社会に向けた光通信技術の飛躍的な高度化への挑戦」(2016.7)

[11] ImPACT 未来開拓研究会「ディジタルコヒーレント通信の最前線」(2016.11)

廣岡俊彦

[1] 宮城県泉高等学校「大学出張講義」（2016 年 5 月）

[2] 電子情報通信学会 OCS Summer School 基礎コース「光変復調の基礎」講師（2017.7）

[3] 河合塾仙台校「大学出張講義」（2017.9）

吉田真人

[1] 秋田県立横手高等学校「大学出張講義」（2013.9）

[2] 仙台高等専門学校「特別講義」（2016～現在）

葛西恵介

[1] たのしいサイエンス・サマースクール実行委員（2018~現在）

4. 競争的資金の獲得状況 / Research funds/grants received

(1) 科学研究費補助金 / Grant-in-Aid for Scientific Research (KAKENHI)

[1] 特別推進研究「多機能なコヒーレントナイキストパルスの提案とそれを用いた超高速・高効率光伝送技術」（代表者名：中沢正隆、交付金総額 483,900 千円）（平成 26 – 30 年度）

[2] 若手研究 A「コヒーレント光通信用狭線幅周波数安定化レーザの開発」交付金総額 15,700 千円（代表者名：葛西恵介、平成 26 – 27 年度）

[3] 挑戦的萌芽研究「広帯域光 VCO によるコヒーレント光通信用高精度光位相制御技術の確立」交付金総額 2,900 千円（代表者名：葛西恵介、平成 26 – 27 年度）

(2) 受託研究費 / Other grants and subsidies

[1] 国立研究開発法人　情報通信研究機構　高度通信・放送研究開発委託研究「革新的光通信インフラの研究開発」（代表者名：NTT 未来ねっと研究所　高良秀彦、交付金総額 208,000 千円、平成 23 – 27 年度）

[2] 国立研究開発法人　情報通信研究機構　高度通信・放送研究開発委託研究「革新的光ファイバの実用化に向けた研究開発」（代表者名：KDDI 総合研究所　森田逸郎、交付金総額 577,000 千円、平成 25 – 29 年度）

[3] 国立研究開発法人　情報通信研究機構　高度通信・放送研究開発委託研究「光信号の低コスト受信・モニタリングのための小型光位相同期回路の研究開発」（代表者：葛西恵介、交付金総額 35,000 千円、平成 27 – 31 年度）

[4] 総務省委託研究「第 5 世代移動通信システム実現に向けた研究開発～超高密度マルチバンド・マルチアクセス多層セル構成による大容量化技術の研究開発～」（代表者：NTT アクセスネットワークシステム研究所　大高明浩、交付金総額 175,800 千円、平成 27－30 年度）

[5] 総務省　ICT 重点技術の研究開発プロジェクト「高効率光アクセスメトロ技術」（代表者：葛西恵介、交付金総額 55,000 千円、平成 30 – 33 年度）

[6] 総務省　ICT 重点技術の研究開発プロジェクト「マルチコア大容量光伝送システム技術」（代表者名：吉田真人、交付金総額 56,000 千円、平成 30 – 33 年度）

[7] 国立研究開発法人　情報通信研究機構　高度通信・放送研究開発委託研究「Beyond 5G に向けたモバイル収容大容量光アクセスインフラの研究開発」（代表者名：廣岡俊彦、交付金総額 59,632 千円、平成 30 – 33 年度）

5. 国際共同研究・連携研究・連携教育活動の実績

International joint research, collaborative research, and collaborative education

[1] 東北大学重点戦略支援プログラム「将来の大学間協定を見据えた東北大学電気通信研究所－MIT 電子工学研究所国際共同研究プロジェクト(RIEC-RLE Project)」（2010 ～ 2015 年）

[2] 日本学術振興会外国人研究者招へい事業　マクマスター大学工学部電気情報工学科・Shiva Kumar 教授（2016 年 11 月 ～ 2017 年 7 月）「コヒーレントナイキストパルス伝送における非線形波形歪みの解析とその補償技術の開発」

6. 共同利用・共同研究拠点活動の実績

Achievements of work done under the framework of Joint Usage/Research Center

[1] 通研共同プロジェクト研究「超高速コヒーレント光制御による極限通信・計測システムに関する研究」(2011~2013 年度、研究代表者：土田英実)

[2] 通研共同プロジェクト研究「光ファイバーネットワークを利用した地震・津波・地殻変動の面的な計測技術に関する研究」(2012~2014 年度、研究代表者：新谷昌人)

[3] 通研共同プロジェクト研究「マルチキャリア光波による先進通信・計測システムに関する研究」(2014~2016 年度、研究代表者：土田英実)

[4] 通研共同プロジェクト研究「光ファイバーネットワークを利用した地震・津波・地殻変動の面的な計測技術に関する研究」(2015~2017 年度、研究代表者：新谷昌人)

[5] 通研共同プロジェクト研究「光波とマイクロをシームレスに繋ぐフルコヒーレント通信・計測システムに関する研究」(2017~2019 年度、研究代表者：土田英実)

[6] 通研共同プロジェクト研究「光の空間モードに関する研究開発」(2018~2020 年度、研究代表者：浜本貴一)

[7] 通研共同プロジェクト研究「光ファイバーネットワークを用いた火山活動監視のための重力計測技術に関する研究」(2018~2020 年度、研究代表者：新谷昌人)

7. 研究教育指導 / Research supervision

(1) 担当講義リスト / List of lectures

中沢正隆

「電磁気学 II」(学部 3 年, ~2017)

「光通信工学」(大学院修士課程, ~2017)

「超高周波情報工学」(大学院博士課程, ~2017)

「異分野クロスセッション II」(大学院共通科目, ~2015)

「融合領域合同講義」(全学大学院修士課程, 2016~)

廣岡俊彦

「電気・通信・電子・情報工学実験Ｃ」(学部 3 年, 2007~2015)

「Electricity and Magnetism B」(JYPE プログラム、2012~2016)

「電磁気学 I」(学部 2 年, 2017)

「電磁気学 II」(学部 3 年, 2018~)

吉田真人

「電気回路学 I 演習」(学部 2 年, 2016~現在)

(2) 学位取得者リスト

List of bachelor's, master's and doctoral degree students supervised

博士論文

[1] 王怡昕「Study on Laser-Diode Based Optical Phase-Locked Circuits and Their Application to Multi-Level Coherent Optical Transmission (LD 型光位相同期回路とその多値コヒーレント光伝送への応用に関する研究)」(2015.3)

[2] 藤崎晃「波長 1.5 μm 帯高出力エルビウム光ファイバ増幅器に関する研究」(2015.3)

[3] David Odeke Otuya「Study on Digital Coherent Optical Pulse Transmission with a High Spectral Efficiency（高い周波数利用効率を有するデジタルコヒーレントパルス伝送に関する研究）」(2016.3)
[4] 原子広大「超高速光ナイキストパルス伝送に関する研究」(2016.3)
[5] 岡本聖司「デジタルコヒーレント光伝送における超多値信号の高精度歪み補償に関する研究」(2018.3)

修士論文

[1] 小野敬人「カーボンナノチューブとグラフェンを可飽和吸収体に用いたフェムト秒レーザの特性比較」(2014.3)
[2] 得平和成「Cs 光原子時計のハイブリッドモード同期に関する研究」(2014.3)
[3] 別府翔平「超多値 QAM デジタルコヒーレント伝送に関する研究」(2015.3)
[4] 瀬谷大輝「光ナイキストパルスによる超高速伝送に関する研究」(2015.3)
[5] 中尾允俊「チューナブル狭線幅ファイバレーザと波長多重伝送への応用」(2016.3)
[6] 吉田一貴「周波数安定化パルスレーザとコヒーレント光伝送への応用」(2016.3)
[7] 鈴木大貴「5～10 Tbit/s/ch 光ナイキストパルス伝送に関する研究」(2017.3)
[8] 王建平「光ナイキストパルスを用いた単一チャンネル 10 Tbit/s 伝送に関する研究」(2018.3)
[9] 管貴志「注入同期技術を用いた大容量デジタルコヒーレント光伝送に関する研究」(2018.3)
[10] 寺山雅樹「QAM デジタルコヒーレント伝送における超多値化に関する研究」(2018.3)
[11] 新田純平「コヒーレント光ナイキストパルスを用いた高速・高効率伝送に関する研究」(2018.3)
[12] 木村光佑「光ナイキストパルスを用いた超高速・高効率ディジタルコヒーレント伝送に関する研究」(2019.3)

8. 叙勲・受賞・表彰 / Honors, awards, and prizes

[1] 中沢正隆, 日本学士院賞(2013.6)
[2] 大宮達則, OECC 2013 Best Paper Award (2013.7)
[3] 中沢正隆, MOC (Micro Optics Conference) Award (2013.10)
[4] 中沢正隆, NEC 財団 C&C 賞 (2013.11)
[5] 別府翔平, OFC 2014 Outstanding Student Paper Competition Honorable Mention (2014.3)
[6] 中沢正隆, OSA Charles Hard Townes Award (2014.6)
[7] 中沢正隆, International Wire & Cable Symposium, Inc・Jack Spergel Memorial Award (2014.11)
[8] 王怡昕, ACP 2014, IEEE Photonics Society Best Student Paper Awards (1st Grade Awards) (2014.11)
[9] 中沢正隆, 第 64 回河北文化賞 (2015.1)
[10] David Odeke Otuya, 平成 26 年度電子情報通信学会学術奨励賞 (2015.3)
[11] 別府翔平, 平成 26 年度電子情報通信学会学術奨励賞 (2015.3)
[12] 中沢正隆, 第 56 回藤原賞 (2015.11)
[13] 原子広大, 平成 27 年度電子情報通信学会学術奨励賞 (2016.3)
[14] 管貴志, IEEE Sendai Section Student Awards 2016 "The Encouragement Prize" (2016.12)
[15] 寺山雅樹, IEEE Sendai Section Student Awards 2016 "The Encouragement Prize" (2016.12)
[16] 木村光佑, 平成 28 年度電子情報通信学会東北支部優秀学生表彰 (2017.3)

[17] 吉田真人, みやぎ産業科学振興基金研究奨励賞 (2017.5)
[18] 中沢正隆, 電子情報通信学会 100 周年記念マイルストーン賞 (2017.9)
[19] 吉田真人, OECC 2018 Best Paper Award (2018.7)
[20] 木村光佑, OECC 2018 Best Student Paper Award (2018.7)
[21] 平田綾也, 電子情報通信学会 OFT 研究会学生ポスター奨励賞最優秀賞 (2018.10)
[22] 木村光佑, 電子情報通信学会 OFT 研究会学生ポスター奨励賞優秀賞 (2018.10)
[23] 竹節直也, 電子情報通信学会 OFT 研究会学生ポスター奨励賞優秀賞 (2018.10)
[24] 管貴志, 平成 30 年度電子情報通信学会学術奨励賞 (2019.3)
[25] 平田綾也, 平成 30 年度電子情報通信学会学術奨励賞 (2019.3)