

REFERENCES

- Agrawal, G. P. (2007). Nonlinear Fibre Optics. Fourth edition, Academic Press.
- Agrawal, G. P. (2001). Nonlinear Fibre Optics, 3rd ed. Academic Press, San Diego.
- Agrawal G. P. (2001). Applications of Nonlinear Fibre Optics., Academic press, San Diego, California 92101-4495, USA.
- Ahmad, H., Shahi S., and Harun, S. W. (2009). Multi-wavelength laser generation with Bismuth-based Erbium-doped fibre., Optics Express, 17 (1): 203-207.
- Alahbabi M N, Cho Y T, Newson T P. (2005) 150-km-range distributed temperature sensor based on coherent detection of spontaneous Brillouin backscatter and in-line Raman amplification., Journal of the Optical Society of America: B, 22(6): 1321–1324.
- Andersen, T.V., Hilligsøe, K., Nielsen, C., et al. (2004). Continuous-wave wavelength conversion in a photonic crystal fibre with two zero-dispersion wavelengths,” Opt. Express, 12: 4113–4122.
- André P.S. and Pinto, J.L. (2002). Simultaneously measurement of the nonlinear refractive index and chromatic dispersion of optical fibres by four-wave mixing., Microwave Opt. Technol. Lett. 34 (4) : 305–307.
- Aso, O., Arai, S. I., Yagi, T., Tadakuma, M., Suzuki, Y., Namiki, S. (2000). Broadband four-wave mixing generation in short optical fibres,” Electronics Letters, 36(8) : 709 – 711.
- Azuma, Y., Shibata, N., Horiguchi, T. and Tateda, M. (1988). Wavelength dependence of Brillouin-gain spectra for single-mode optical fibres., Electron. Lett., 24: 250-252.
- BaggettJ. C., MonroT. M., FurusawaK., and RichardsonD. I. (2001). Comparative study of large-mode holey and conventional fibres., Opt.Lett., 26: 1048-50.
- Banchi, L., Presi, M., Proietti R. and Ciaramella, E. (2010). System feasibility of using stimulated Brillouin scattering in self coherent detection schemes., Optics Express, 18 (12) : 12702-12707.
- Barnes,W. L., Laming,R. I., Tarbox,E. J., &Mokel, P. R. (1991). Absorption and emission cross section of Er^{3+} doped silica fibre. IEEE, J. Quantum Electronics, 27:1004-1010.
- Bass M., Enoch J. M., Van Stryland E. W., and Wolfe W. L. (2001). Fibre Optics and Nonlinear Optics., McGRAW-HILL, 4.
- Bates, Regis J. (2001). Optical Switching and Networking Handbook (New York: McGraw Hill).

- Bayvel P. and Giles, I. P. (1989). Evaluation of performance parameters of single-mode all-fibre Brillouin ring lasers. *Opt. Lett.* 14: 581-583.
- Becker, P. C., Olsson, N. A., Simpson, J. R. (1997). Erbium-doped fibre amplifiers, Fundamentals and Technology. Academic Press.
- Becker P. (2003). Thermal and optical properties of glasses of the system $\text{Bi}_2\text{O}_3 - \text{B}_2\text{O}_3$., *Cryst. Res. Technol.* 38(1): 74.
- Belardi, W. Lee, J. H., Furusawa, K., Petropoulos, P., Ibsen, M., monro, T. M. and Richardson, D. J. (2002). A 10 Gbit/s tunable wavelength converter based on four-wave mixing in highly nonlinear holey fibre. conference on optical communication in Europe, PD1.2, Copenhagen, Denmark.
- Beugnot,J.-C., Sylvestre,T., Alasia, D., Maillette, H., Laude, V., Monteville, A., Provino,L., Traynor,N., Foaleng Mafang,S. and Thévenaz, L. (2007). Complete experimental characterization of stimulated Brillouin scattering in photonic crystal fibre. *Optic Express*, 15(23):15517-22.
- Bjarklev, A., Broeng, J. and Bjarklev, A. S. (2003). Photonics Crystal Fibres, Kluwer Academic Publishers.
- Bogoni, Poti L. and Bononi, A. (2003). Accurate measurement of in-band FWM power in DWDM systems over nonzero dispersion fibres., *IEEE Photonics Technology Letters*, 15(2) ; 260-262.
- Born, M. and Wolf, E. (1999). Principles of Optics, 7th. ed., Cambridge University Press, New York.
- Boyd R. W. (2003). Nonlinear Optics, Academic Press.
- Boyd R. W., Rzazewski K., and Narum P. (1990). Noise initiation of stimulated Brillouin scattering., *Phys. Rev. A, Gen. Phys.*, 42(9): 5514–5521.
- Boyd, R. W., (2008). Nonlinear Optics. Academic Press, San Diego.
- Brillouin L. (1922). Diffusion de la lumiere et des rayons X par un corps transparent homogene: influence de l'agitation thermique., *Annales de Physique*, 17: 88-122.
- Broeng, J., Mogilevstev, D., Barkou, S. B. and Bjarklev, A. (1999). Photonic crystal fibres: a new class of optical waveguides. *Opt. Fibre Technol.*, 5: 305-330.
- Butcher P. N., and Cotter D. (1990). The Elements of Nonlinear Optics. Cambridge University Press, 1990.
- Chen D., Sun B., Wei Y., Gao Sh., and He S. (2010). Some Wavelength-Spacegtinuously Tunable Multi-wavelength Fibre Lasers Based on Four-Wave-Mixing Effect” in Photonics in Switching, OSA Technical Digest (CD) (Optical Society of America) paper JTdB37.

ChenY., HuangY., HuangM., ChenR., LuoZ. (2004). Luminescence of Erbium-doped Bismuth–borate glasses., Opt. Mater. 25(7): 271.

ChenY., HuangY., HuangM., ChenR., LuoZ., CeramJ. Am. (2005). THz diffuse reflectance spectra of selected explosives and related compounds., 19(6): **5790**.

Chiao, R. Y., Townes, C. H., and Stoicheff, B. P. (1964). Stimulated Brillouin Scattering and Coherent Generation of Intense Hypersonic Waves. Phys. Rev. Lett. vol. 12, pp. 592-595.

Cho, Y. T., Alahbabi, M. N., Brambilla, G., and Newson, T. P. (2005). Distributed raman amplification combined with a remotely pumped EDFA utilized to enhance the performance of spontaneous brillouin-based distributed temperature sensors. IEEE Photon. Technol. Lett., 17: 1256-1258.

Choi H. Y., Park K. S., and Lee B. H. (2008). Photonic crystal fibre interferometer composed of a long period fibre grating and one point collapsing of air holes. Optics Letters, 33(8): 812–814.

Chow, K.K., Shu, C., Lin, C.L., Bjarklev, A. (2005). Polarization-insensitive widely tunable wavelength converter based on, four-wave mixing in a dispersion-flattened nonlinear photonic crystal fibre., IEEE Photon. Technol. Lett., 17 : 624–626.

Chremmos, I.D., Kakarantzas, G., Uzunoglu, N.K. (2005). Independent core propagation in two-core photonic crystal fibres resulting from structural nonuniformities., Opt. Commun.251 : 339.

Christodoulides, D. N. and Jander, R. B. (1996). Evolution of stimulated Raman crosstalk in wavelength division multiplexed systems., IEEE Photon. Technol. Lett., 8: 1722.

Cohen, L.G. (1985). Comparison of single-mode fibre dispersion measurement techniques., J. Lightwave Technol., 3 (5) : 958 - 966.

Cotter D. (1983). Stimulated Brillouin scattering in monomode optical fibre., J. Opt. Commun. 4:10.

Cowle G. J. and StepanovD. Y. (1996a). Hybrid Brillouin/erbium fibre laser., Opt. Lett., 21: 1250-1252.

Cowle, G. J. and Stephanov, D. Yu. (1996b). Multiple wavelength generation with Brillouin/Erbium fibre lasers., IEEE Photon. Technol. Lett., 8: 1465-1467.

Cowle, G. J., Loh, W. H., Laming R. I. & Stephanov, D. Yu. (2007). Multiwavelength operation of Brillouin/erbium fibre lasers with injection-locked seeding., IEEE Optical Fibre Conference (OFC).

Cowle, G. J., Loh, W. H., Laming R. J. and Stepanov, D. Y. (1997). Multi-wavelength operation of Brillouin/Erbium fibre laser with injection-locked seeding., Optical Fibre Communication Conf. OFC., 97: 34–5.

- Dai, Y., Chen, X., Sun, J., Yao, Y., Xie, S. (2006). Dual-Wavelength DFB Fibre Laser Based on a Chirped Structure and the Equivalent Phase Shift Method., IEEE Photon. Technol. Lett. 18 (18): 1964.
- Derickson, D. (1998). Fibre Optic Test and Measurement., Prentice-Hall Inc.
- Desurvire, E. (1994). Erbium-doped Fibre Amplifiers: Principle and Application. John Wiley & Son, New York.
- Desurvire, E., Simpson, J. R. (1989). Amplification of spontaneous emission in erbium-doped single-mode fibres. J. Light. Tech., 7: 835-845.
- Desurvire, E., Zyskind, J. L., & Giles, C. R. (1990a). Design optimization for efficient erbium-doped fibre amplifiers. IEEE J. Light. Tech. 8:1730-1735.
- Desurvire E., ZyskindJ. L., and SimpsonJ. R. (1990b). Spectral gain hole-burning at $1.53\mu\text{m}$ in Erbium-doped fibre amplifiers., IEEE Photon. Technol. Lett. 2: 246-248.
- Desurvire, E., Simpson, J. R. and Becker, P.C. (1987). High-gain erbium-doped traveling - wave fibre amplifier. Opt. Lett., 12: 888-889.
- Di Teodoro,F., Hoffman, P.R. (2005). Four-wave mixing self-stability based on photonic crystal fibre and its applications on erbium-doped fibre lasers.Opt. Commun., 252: 111.
- Diament P. (1990). Wave Transmission and Fibre Optics, Macmillan.
- Diddams S. A., Jones D. J., Ye J., Cundiff S. T., Hall J. L., Ranka J. K., and Windeler R. S. (2001). Direct RF to optical frequency measurements with a femtosecond laser comb," IEEE Trans. Instrum. Meas., 50: 552-555.
- DigonnetM. J. F. (1993). Rare Earth Doped Fibre Lasers and Amplifiers. Second edition.
- Dong B., Zhou D. P. and Wei L. (2010). Tunable multiwavelengthBrillouin-erbium fibre laser by controlling self-lasing cavitymodes., oscillation Opt. Fibre Technol. 16: 17.
- Dorman C., Kucukkara I., and Marangos J. P. (1999). Measurement of high conversion efficiency to 123.6-nm radiation in a four-wave-mixing scheme enhanced by electromagnetically induced transparency., Phys. Rev. A, 61:3802-3806.
- During A., FossatiC., and Commandré M. (2002). Multi-wavelength Imaging of Defects in Ultraviolet Optical Materials., Appl. Opt. 41: 3118-3126.
- Eichler, H. J., Kunde, J., Liu, B. (1997). Quartz fibre phase conjugators with high fidelity and reflectivity., Opt. Commun. 139: 327-334.
- Eiselt, M. (1999). Limits on WDM systems due to four-wave mixing: a statistical approach., Journal of Lightwave Technology, 17 (11): 2261-22629.

- Ellison A. J. W., Dickinson J. E., Goforth D. E., Harris D. L., Kohli J. T., Minelly J. D., Samson B. N., and Trenteman J. K.(1999). Hybrid erbium silicate conventional-band fibre amplifier with ultra low gain ripple. In Proc. Opt. Amplifiers Their Amplifications :51-56.
- Feng, X. H., Tam, H. Y. and Wai, P. K. A. (2006). Stable and uniform multiwavelength erbium-doped fibre laser using nonlinear polarization rotation., Opt. Express 14: 8205-8210.
- Fibre System-Technology survey, DWDM lasers fashion networks for the future, Institute of Physics publishing Ltd., 1999.
- Finazzi, V., Monro, T. M., and Richardson, D. J. (2003). Small core silica holey fibres:Nonlinearity and confinement loss trade-offs., Journal of Optical Society of America B, 20: 1427-1436.
- FranceP. W. (1991). Optical fibre lasers and amplifiers., Blackie and son Ltd.
- Geng, D., Beugnot,J.C., Sylvestre, T., Maillette,H., M'elin,G., and Laude, V. (2007). Guided acoustic wave Brillouin scattering in photonics crystal fibres., Opt. Lett., 2: 17–19.
- Geng, J., Staines, S., and Jiang, S. (2008). Dual-frequency Brillouin fibre laser for optical generation of tunable low-noise radio frequency/microwave frequency. Opt. Lett., 33:16-18.
- Geng, J., Staines, S., Wang, Z., Zong, J., Blake, M. and Jiang. S. (2006). Highly stable low-noise Brillouin fibre laser with ultra narrow spectral line width. IEEE Photon. Technol. Lett., 18: 1813-1815.
- Genty G., Lehtonen M., Ludvigsen H., Broeng J., and Kaivola M. (2002). Spectral broadening of femto second pulses into continuum radiation in microstructured fibres., Opt. Express 10, 1083-1098.
- Graydon, O., Loh, W. H., Laming, R. L. and Dong, L. (1996). Triple frequency operation of an Er-doped twin core fibre loop laser, IEEE Photonics Technology Letters, 8: 63-65.
- Gross, E. (1930). Change of wavelength of light due to elastic heat waves at scattering in liquids. Nature, 126 (201): 400.
- Gross, M. C., Callahan, P. T., Clark, T. R., Novak, D., Waterhouse R. B. and Dennis, M. L. (2010). Tunable millimeter-wave frequency synthesis up to 100 GHz by dual-wavelength Brillouin fibre laser., Optics Express, 18 (13) : 13321-13330.
- Guan W. and MarcianteJ. R. (2010). Power scaling of single-frequency hybrid Brillouin/Ytterbium fibre lasers., IEEE J. of Quantum Electronics, 46(5): 674.
- Guan, B. O., Tam, H. Y., Liu, S. Y., Wai, P. K. A. & Sugimoto, N. (2003). Ultrawide-band La-codoped Bi₂O₃-based EDFA for L-band DWDM systems. IEEE Photon. Technol. Lett., 15(11):1525–1527.

Hack, R. (2003). Material processing with fibre lasers. Industrial Laser Solutions for Manufacturing, 18 (2).

Han, Y., Tran, T. V. A, Kim, S., and Lee, S. B. (2005). Multiwavelength Raman-fibre-laser-based long-distance remote sensor for simultaneous measurement of strain and temperature., Opt. Lett. 30: 1282-1284.

Harrison, R. G., Kovalev, V. I., Lu, W., Yu, D. (1999). SBS self-phase conjugation of CW Nd:YAG laser radiation in an optical fibre., Opt. Commun. 163: 208-211.

Harun, S. W., Cheng, X. S., Saat N. K. and Ahmad, H. (2005). S-band Brillouin erbium fibre laser., Electronics Letters, 41 (4) : 174-176.

Harun, S. W., Shahi S. and Ahmad, H. (2009a). Compact Brillouin-erbium fibre laser., Optics Lett., 34 (1) : 46-48.

Harun, S. W., Shahi, S., Ahmad, H. (2009b). Bismuth erbium doped fibre based multi-wavelength laser assisted by four-wave mixing process," IEICE Electronics express, 6 (1) : 40-43.

Harun, S.W., Aziz, S.N., Tamchek, N., Shahabuddin N.S. and Ahmad, H. (2008). Brillouin fibre laser with 20 m-long photonic crystal fibre., Electronics Letters, 44 (18): 1065–1066.

Harun, S. W., Tamchek, N., Shahi, S.& Ahmad, H. (2009). L-band amplification and multi-wavelength lasing with Bismuth based Erbium doped fibre., Progress In Electromagnetics Research C, 6: 1-12.

Hasegawa T., Nagashima T., Sugimoto N. (2008). Determination of nonlinear coefficient and group-velocity dispersion of bismuth-based high nonlinear optical fibre by four-wave mixing., Optics Communications 281,: 782-787.

Hayashi, H., Sugimoto, N., Tanabe, S. (2006a). High-performance and wideband amplifier using Bismuth-oxide-based EDF with cascade configurations., Optical Fibre Technology, 12: 282-287.

Hayashi,H., Sugimoto, N., TanabeS. & Ohara,S. (2006ab). Effect of hydroxyl groups on Erbium-doped Bismuth-oxide-based glasses for fibre amplifiers., J. Appl. Phys., 99:093105.

Headly C. and Agrawal, G. P. (2005). Raman Amplification in Fibre Optical Communication Systems, Academic Press, Boston.

Hecht, J. City of Light-The Story of Fibre Optics. (Oxford University Press, New York, 1999).

Heiman, D., Hamilton, D. S. and Hellwarth, R. W. (1979). Brillouin scattering measurements on optical glasses., Phys. Rev. B, 19: 6583.

- Hill, K. O., Johnson, D. C., and Kawasaki, B. S. (1976). Low- threshold CW Raman laser. *Appl. Phys. Lett.*, 29: 185- 1886.
- Hill, K. O., Kawasaki, B. S. and Johnson, D.C. (1976), Cw Brillouin laser," *Appl. Phys. Lett.* vol. 28, pp. 608-609.
- Ho, K. P., (2000) .Statistical properties of stimulated Raman crosstalk inWDM systems. *J. Lightwave Technol.*, 18: 915-921.
- Horiuchi, Y., Yamamoto, S., and Akiba, S. (1998). Stimulated brillouin scatteringsuppression effects induced by cross-phase modulation in highpower WDM repeaterless transmission. *Electron. Lett.* vol. 34, pp. 390-391.
- Huang C. H., Zhang G., WeiY., ZhuH. Y. , and HuangL. X. (2010). A compact and efficient four-wavelength Q-switched Nd:YAP laser.*Laser Phys.* 20: 745.
- Inoue K. (1992a). Four-wave mixing in an optical fibre in the zero-dispersion wavelength region., *Journal of Lightwave Technology*, 10: 1553-1561.
- Inoue K. and Toba H. (1992b). Wavelength conversion experiment using fibre four-wave mixing., *IEEE Photonics Technology Letters*, 4: 69-72.
- Inoue,K. (1995). Brillouin threshold in an optical fibre with bidirectional pump lights. *Opt. Commun.* 120: 34-38.
- Jackson J. D., 3rd, (1998). Classical Electrodynamics, 3rd *edn*, Wiley & Sons, New York: 671.
- Jaunart, E., Crahay, P., Megret, P., Froidure, J. C., Lamquin, M.& Blondel, M. (1994). Analysis of numerical methods efficiency for EDFA modeling. *Electrotechnical Conference*, 5:145 – 148.
- Jenkins, F. A., White, H. E., (2001). Fundamentals of Optics, 4th Ed., Mc Graw-Hill, New York.
- Joly, N.Y., Omenetto, F.G., Efimov, A., et al. (2005). Spectrally smooth supercontinuum from 350 nm to 3 μ m in sub-centimeter lengths of soft-glass photonic crystal fibres., *Opt. Commun.* 248 : 281.
- Jones D. J., Diddams S. A., Ranka J. K., Stentz A., Windeler R. S., Hall J. L., and Cundiff S. T. (2000). Carrier-envelope phase control of femtosecond mode-locked lasers and direct optical frequency synthesis., *Science Journal*, 288: 635-639.
- Ju J., Jin W., and Demokan M. S. (2004). Two-mode operation in highly birefringent photonic crystal fibre. *IEEE Photonics Technology Letters*, 16(11): 2472–2474.
- Kapron, F. P., Keck, D. B. and Maurer, R. D., (1970). Radiation losses in glass optical waveguides. *Applied Physics Letters*, 17: 423-425.

Kim, H. K., Lee, H. K., Park, S. Y., Lee, E. H. (1993). Calculation os dispersion and nonlinear effect limited maximum TDM and FDM bit rates of transform limited pulses in single-mode optical fibres. *J. Lightwave Technol.* 13: 1597-1605.

Knight, J. C., Birks, T. A., Russell, P. St. J. and Atkin, D. M. (1996). All-silica single-mode optical fibre with photonic crystal cladding., *Opt. Lett.* 21: 1547.

KnightJ. C., BirksT. A., CreganR. F., RussellP. S. J., and de SandroJ. P. (1998). Large mode area photonic crystal fibre., *Electronics Lett.*, 34: 1347-1348.

Koch, F., Reeves-Hall, P. C., Chernikov, S. V. and Taylor, J. R. (2001). CW multiple wavelength, room temperature, Raman fibre ring laser with external 19 channel, 10 GHz pulse generation in a single electro-absorption modulator," *Opt. Fibre Commun. Conf.*, Anaheim, CA, 3.

Koester C. J. and Snitzer E. (1964). Amplification in a fibre laser., *Appl. Opt.* 3:1182-1186. Koroshetz, J. E. (2005). Fibre Lasers for lider. IEEE OFC conference, Optical Fibre Communication Conference, 5 (3): 6.

Koyamada, Y., Sato, S., Nakamura, S., Sotobayashi, H. and Chujo, W. (2004).Simulating and Designing Brillouin Gain Spectrum in Single-Mode Fibres., *J. Lightwave Technol.*, 22, 631-639.

Kuzin, E. A., Petrov, M. P., Davydenko, B. E. (1985). Phase conjugation in an optical fibre., *Opt. Quant. Electron.* QE-17: 393-397.

Lamminpää, A., Niemi, T., Ikonen, E., Marttila, P. and Ludvigsen H., Effects of dispersion on nonlinearity measurement of optical fibers Optical Fiber Technology, 11, pp. 278-285 (2005).

Laude, V., Khelif,A., Benchabane, S., Wilm, M., Sylvestre,T., Kibler,B., Mussot, A., DudleyJ. M. and Maillette,H.(2005). Phononic band-gap guidance of acoustic modes in photonic crystal fibres.*Phys. Rev. B.*, 71: 045107.

(a) Lee J. H., Teh P. C., Petropoulos P., Ibsen M., and Richardson D. J. (2001). Reduction of inter channel interference noise in a two-channel, grating based OCDMA system using a nonlinear optical loop mirror., *IEEE Photonics Technology Letters*, 13: 529-531.

(a)Lee, J. H., Tanemura, T., Kikuchi, K., Nagashima, T., Hasegawa, T., Ohara, S. and Sugimoto, N. (2005). Experimental comparison of a Kerr nonlinearity figure of merit including the stimulated Brillouin scattering threshold for state-of-the-art nonlinear optical fibres., *Opt. Lett.*, 30 (13) : 1698-1700.

(b) Lee, J.H., Tanemura, T., Nagashima, T., Hasegawa,T., Ohara,S., Sugimoto,N.& Kikuchi,K. (2005). Experimental comparison of a Kerr nonlinearity figure of merit including the stimulated Brillouin scattering threshold for state-of-the-art nonlinear optical fibres. *Opt. Lett.* 30 (11): 1267-1272.

(b) Lee, S. S., Lee, H. J., Seo, W. and Lee, S. G. (2001). Stimulated Brillouin Scattering Suppression Using Cross-Phase Modulation Induced by an Optical Supervisory Channel in WDM Links. *IEEE Photon. Technol. Lett.*, 13: 741.

Levenson M. D., Shelby R. M., and Perlmutter S. H. (1985). Squeezing of classical noise by nondegenerate four-wave mixing in an optical fibre., *Opt. Lett.* 10:514-516.

Li, K., Xiong, Z., Chu, P. L. (1997). Direct measurement of nonlinear refractive index with an all-fibre Sagnac interferometer., *Opt. Commun.*, 136 : 223-226.

Li, L., Schülzgen, A., Zhu, X., Moloney, J.V., Albert, J., Peyghambarian, N. (2008). 1-W Tunable Dual-Wavelength Emission From Cascaded Distributed Feedback Fibre Lasers., *Appl. Phys. Lett.* 92 (5): 051111.

Lim D. S., Lee H. K., Kim K. H., KangS. B., Ahn J. T., Chang D. I., and JeonM. Y. (1998). Figure-of-eight Brillouin/Erbium fibre lasers., *Electron. Lett.*, 34: 2406-2407.

Liu X. S., Zhan L., Hu X, Li H. G., Shen Q. S. and Xia Y. X. (2009). Multiwavelength erbium-doped fibre laser based on nonlinear polarization rotation assisted by four-wave-mixing., *Opt. commun.* 282: 2913.

Liu, Y., Wang D. and Dong, X. (2008a). Stable room-temperature multi-wavelength lasing oscillations in a Brillouin-Raman fibre ring laser., *Optics Communications*, 281: 5400–5404.

Liu, Y., Wang, D. (2008b). Wavelength tunable and amplitude-equilibrium dual-wavelength lasing sources with dual-pass Raman/Brillouin amplification configuration., *Optics Express*, 16 (6): 3583-3588.

LiY., LiuY. G., XuJ. B., TaiB. Y., and Wang Z. (2010). Tunablemultiwavelength Brillouin-erbium ring-cavity fibre laserwith short-length photonic crystal fibre., *LaserPhys.*, 20:528.

MaimanT. H. (1960). Stimulated optical radiation in ruby masers., *Nature*, 187: 493-494.

Mamyshev P. V. (1998). All-optical data regeneration based on self-phase modulation effect., In Proc. Eur. Conf. Optical Communication (ECOC), Madrid, Spain, Sep., 1: 475–476.

McIntosh, C., Yeniyay,A. and Toulouse,J. (1997). Stimulated Brillouin scattering in dispersion-compensating fibres. *Opt. Fibre. Technol.* 3: 173-176.

Melloni A., Frasca M., Garavaglia A., Tonini A., and Martinelli M. (1998). Direct measurement of electrostriction in optical fibres., *Opt. Lett.*, 23(9): 691–693.

Miya, T., Terunuma, Y., Hosaka, T., and Miyashita, T. (1979). Ultimate low-loss single-mode fibre at 1.55 μm . *Electronics Letters*, 15 (4): 106-108.

Monro, T. M., Richardson D. J., Broderick, N. G. R., and Bannet, P. J. (1999) Holey optical fibres: An efficient modal model. *Journal of Lightwave Technology*, 17(6):1093-1102.

- Monro, T. M., Richardson, D. J., Broderick, N. G. R., and Bennett, P. J. (2000). Modeling Large Air Fraction Holey Optical Fibres. *J. Lightwave Technol.*, 18(1): 50-56.
- Montes C., Bahloul D., BongrandI., BotineauJ., ChevalG., MahmhoudA., PicholleE., and PicozziA. (1999). Self-pulsing and dynamic ability in CW-pumped Brillouin fibre ring lasers. *J. Opt. Soc. Am. B*, 16: 932-951.
- Naito, K. Benino, Y., Fujiwara, T., & Komatsu, T. (2004). Judd-Ofelt parameters of Er³⁺ in transparent TeO₂-based nanocrystallized glasses. *Jour. Solid State. Comm.*, 131: 289.
- Nakagawa, K. (1995). Performance Analysis of CDMA-Based Wireless Services Transmission Over a Turbulent RF-on-FSO Channel. *IEICE Jpn. Pt. Journal*, 78B, 713.
- Nikles, M.; Thevenaz, L.; Robert, P.A. (1997), Brillouin gain Spectrum Characterization in Single-Mode Optival Fibers, *journal of Light Wave Technology*, 15(10), 1842-1851.
- Nicklès, M. (1996). Simple distributed fibre sensor based on Brillouin gain spectrum analysis., *Optics Letters*, 21: 758-761.
- Nobuyuki Y. and Imai T. (1993). Stimulated Brillouin scattering suppression by means of applying strain distribution to fibre with cabling., *Journal of Lightwave Technology*, 11:1519-1522, 1993.
- Pan, S., Zhao, X., Lou, C. (2008). Switchable single-longitudinal-mode dual-wavelength erbium-doped fibre ring laser incorporating a semiconductor optical amplifier., *Opt. Lett.* 33 (8): 764.
- Parker, T. R., Farhadiroushan, M., Feced, R., Handerek, V. A. and Rogers, A. J. (1998). simultaneous distributed measurement of strain and temperature from noise-initiated Brillouin scattering in optical fibers., *IEEE J. Quantum Electron.*, 34: 645- 649.
- Petropoulos P., Monro T. M., Belardi W., Furusawa K., Lee J. H., and Richardson D. J. (2001). A 2R-regeneration all-optical switch based on a highly nonlinear fibre., *Optics Letters*, 26:1233-1235.
- Pierre, R. St., Mordaut, D. W., Injeyan, H., Bery, J. G., Hilyard, R. C., Weber, M. E., Wickham, M. G., Harpole, G. M., Senn, R. (1997). Diode array pumped kilowatt laser., *IEEE J. Sel. Topics Quant. Electron.* QE-3: 53-58.
- Pleros, N., Bintjas, C., Kalyvas, M., Theophilopoulos, G., Yiannopoulos, K. Sygletos, S. and Avamopoulos, H. (2002). Multiwavelength and power equalized SOA laser sources. *IEEE Photon. Technol. Lett.*, 14: 693-695.
- Polynkin, P., Roussev, R., Fejer, M., Peyghambarian, N., Moloney, J. (2007). Laser transmitter for undersea communications using third-harmonic generation of fibre-laser system at 1.5 μm., *IEEE Photon. Technol. Lett.*, 1328-1330.

- Russell P. S. J. (2006). Photonic-Crystal Fibres”, J. LightwaveTechnology,24(12): 4729–4749.
- RussellP. S. J. (2003). Photonic crystal fibres., Science, 299: 358-362.
- S. W. Harun, N. Tamchek, P. Poopalan and H. Ahmad. (2003). L-band Brillouin- Erbium Fibre Laser., Laser Physics, 13(9): 1161-1163.
- Sanferrare, R. J. (1987). Terrestrial Lightwave systems, AT&T Technical Journal, 66 (1): 95-107.
- SangheraJ. S., FloreaC. M., ShawL. B, Pureza aP., NguyenV.Q., BashkanskyM., DuttonZ., AgrawalI.D. (2008). Non-linear properties of Chalcogenide glasses and fibres Non-Crystalline Solids.,354:462-467.
- Shahi, S., Harun S. W. and Ahmad, H. (2009). Multi-wavelength Brillouin fibre laser using a holey fibre and a bismuth-oxide based erbium-doped fibre., Laser Physics Letters, 6 (6): 454-457.
- Shahi, S., Harun, S.W., Shahabuddin, N.S., Shirazi M.R. and Ahmad, H. (2009). Multi-wavelength generation using a bismuth-based EDF and Brillouin effect in a linear cavity configuration, Optics & Laser Technology, 41(2): 198-201.
- Sharping J. E., Fiorentino M., Kumar P., and Windeler R. S. (2002). Optical parametric oscillator based on four-wave mixing in microstructure fibre., Optics Letters, 27: 1675-1677.
- Sharping, J. E., Fiorentino, M., Coker, A., Kumar, P., and Windeler, R. S. (2001). Four-wave mixing in microstructure fibre., Opt. Lett. 26: 1048-1050.
- Shen, D. Y., Sahu, J. K. and Clakson, W. A. (2004). Highly efficient Er,Yb-doped fibre laser with 188W free-running and > 100W tunable output power. Opt. Express, 12: 6230-6239.
- Shibata, N., Okamoto, K. and Azuma, Y. (1989). Longitudinal acoustic modes and Brillouin-gain spectra for GeO₂-doped-core single-mode fibres., J. Opt. Soc. Am. B, 6: 1167-1174.
- Shibata, N., Waarts, R. G.and Braun,R. P. (1987). Brillouin-gain spectra for single-mode fibres having pure-silica, GeO₂-doped, and P₂O₅-doped cores.Opt. Lett., 12: 269-71.
- Shirazi, M. R., Harun, S. W., Biglary M. and Ahmad, H. (2008). Linear cavity Brillouin fibre laser with improved characteristics., Optics Lett., 33 (8): 770-772.
- Shirazi M. R., HarunS. W., BiglaryM., ThambiratnamK., and AhmadH. (2007). Effect of Brillouin pump linewidth on the performance of Brillouin Fibre Lasers., ISAST Transactions on Electronics and Signal Processing, 1(1):30-32.

- Singh, S. P. and N. Singh. Nonlinear effects in optical fibers: origin, management and applications, Progress In Electromagnetics Research, Vol. 73, 249-275, 2007.
- Sinha R. K. and Varshney S. K. (2003). Dispersion properties of photonic crystal fibres", Microw. Opt. Technol. Lett. 37: 129-132.
- Slusher R. E., Hollberg L. W., Yurke B., Mertz J. C., and Valley J. F. (1985)., Observation of squeezed states generated by four-wave mixing in an optical cavity., Phys. Rev. Lett. 55: 2409-2412.
- Smith R. G. (1972). Optical power handling capacity of low-loss optical fibres as determined by stimulated Raman and Brillouin scattering., Appl. Opt., 11: 2489-2494.
- Smith, S. P., Zarinetchi, F. and Ezekiel, S. (1991). Narrow-linewidth stimulated Brillouin fibre laser and applications," Opt. Lett., 16: 393-395.
- Snokes, E., van den Hoven, G. N.&Polman,A. (1995). Cooperative upconversion in Erbium -implanted soda-lime silicate glass optical waveguides. J. opt. Soc. Am. B, 12: 1468-1474.
- Song, S., Allen, Ch. T., Demarest, K. R. and Hui, R. (1999). Intensity-dependent phase-matching effects on four-wave mixing in optical fibre., J. Lightwave Technol., 17 (11) : 2285 - 2290.
- Song, Y. J., Zhan, L., Hu, S., Ye, Q. H., and Xia, Y. X. (2004). Tunable multiwavelength Brillouin-erbium fibre laser with a polarization-maintaining fibre Sagnac loop filter., IEEE Photon. Technol. Lett., 16 (9): 2015–2017.
- Stolen, R.H., Reed, W.A., Harvey, G.T. (1998). Measurement of the Nonlinear Refractive Index of Long Dispersion-Shifted Fibres by Self-Phase Modulation at 1.55 μm ., J. Lightwave Technol. 16 (6): 1006.
- Stone J. and Burrus C. A. (1974). Neodymium-doped fibre lasers: room temperature CW operation with an injection laser pump., Appl. Opt., 13: 1256-1258.
- Strutz, S. J., Williams, K. J. and Esman, R. D. (2001). Polarization-maintaining hybrid erbium-Brillouin amplifier for high-power low-noise sources. IEEE Photon. Technol. Lett., 13(9): 936-938.
- Sugimoto, N., Kuroiwa, Y., Ochiai, K., Ohara, S., Fuku-sawa, Y. and Ito, S., Novel Short-Length EDF for C+L Band Amplification., in: Conf. paper of the Optical Amplifiers and Their Applications Conference, Quebec, Canada, July 9, 2000 (OAA 2000), paper PDP3.
- Sugimoto, N., Nagashima, T., Hasegawa, T., Ohara, S., Taira, K. and Kikuchi, K. (2004). Bismuth-based optical fibre with nonlinear coefficient of 1360 W $^{-1}\text{km}^{-1}$., in Optical Fibre Communication Conference, Vol. 2 of OSA Technical Digest Series (Optical Society of America), paper PDP26.

- Sugimoto, N., Nagashima, T., Hasegawa,T., Ohara,S., Taira,K.&Kikuchi, K. (2004). Bismuth-based optical fibre with nonlinear coefficient of $1360\text{W}^{-1}\text{ km}^{-1}$., in: Proceedings of the Optical Fibre Communications Conference (OFC), LA, (Postdeadline paperPDP26).
- Sugimoto N., Hasegawa T., Nagashima T. and Ohara S. (2004). Bi-based fibres for amplifiers and nonlinear applications., IEEE Photonics Technol. Lett., 34-36.
- Sugimoto N., OchiaiK., HiroseT., OharaS., FukasawaY. (2004). Ultracompact gain block with Bi_2O_3 -based Erbium-doped fibre., Jpn J Appl Phys. 43:2551–2.
- Sun, J., Huang, L. (2007). Photonic generation of frequency-switchable microwave signals exploiting polarization-induced spectrum splitting in fibre grating-based Fabry–Perot filters., Opt. Commun. 273 (2): 482.
- Sun, J., Qiu, J. Huang, D. (2000). Multiwavelength erbium-doped fibre laser exploiting polarization hole burning. Opt Commun. :182.
- SunH. B., LiuX. M., WangL. R., LiX. H., and MaoD. (2010). Spacing-Tunable Multi-Wavelength Fibre LaserBased on Cascaded Four-Wave Mixingin Highly Nonlinear Photonic-Crystal Fibre., Laser Physics, 20(11): 1994–2000.
- Tanabe S., Sugimoto N., Ito S., and Hanada T. (2000). Broad band 1.5 um emission of Er^{+3} ion in Bismuth based glasses for potential WDM amplifier,” J. Lumin., 87 :670-672.
- Tanabe, S., Ohyagi, T., Soga, &N. Hanada, T. (1992). Compositional dependence of Judd-Ofelt parameters of Er^{3+} ions in alkali-metal borate glasses., Phys. Rev. B., 46, 3305-3309.
- Tausenev A.V. and et al., (2008). 177 fs erbium-doped fibre laser mode locked with a cellulose polymer film containing single-wall carbon nanotubes. Appl. Phys. Lett., 92: 171113-171116.
- Teodoro F. Di and Hoffman, P.R. (2005). Four-wave mixing self-stability based on photonic crystal fibre and its applications on erbium-doped fibre lasers., Opt. Commun., 252 : 111-116.
- Vinegoni, Chen, H., Leblanc, M., Schinn, G., Wegmuller, M. and Gisin, N. (2002). Distributed measurements of chromatic dispersion and of nonlinear coefficient in DSF fibres with non negligible values of PMD., presented at the OFC, Anaheim, CA, Paper WA5.
- Walsh B. M. and Barnes, N. P. (2004). Comparison of Tm: ZBLAN and Tm: silica fibre lasers, spectroscopy and tunable pulsed laser operation around 1.9 μm ., Applied Physics B, 78: 325-333.
- Wang X., Nie Q., Xu T., Shen X., Dai S., and Gai N.(2008). Tm^{+3} –doped tellurite glass with Yb^{+3} energy sensitized for broadband amplifier at 1400-1700 nm bands. J. Rare Earths, 26(6): 907-911.

- Wang Y.-P., Jin W., Ju J., et al. (2008). Long period gratings in aircore photonic bandgap fibres,” Optics Express, 16(4): 2784–2790.
- Washburn B. R., Diddams S. A., Newbury N. R., Nicholson J. W., Yan M. F., and Jorgenson C. G. (2004). Phase-locked, Erbium-fibre-laser-based frequency comb in the near infrared., Opt. Lett., 29: 250-252.
- Wu, Z. J., Shen, Q. S., Zhan, L., Liu, J. M., Yuan W. and Wang, Y. X. (2010). Optical Generation of Stable Microwave Signal Using a Dual-Wavelength Brillouin Fibre Laser., IEEE Photon. Technol. Lett., 22(8): 568-70.
- Yamada, E., Takara, H., Ohara, T., Sato, K., Morioka, T., Jinguji, K., Itoh M. and Ishii, M. (2001). A high SNR, 150 ch supercontinuum CW optical source with precise 25 GHz spacing for 10 Gbit/s DWDM systems., Opt. Fibre Commun. Conf., Anaheim, CA.
- Yaman, F., Lin, Q. and G. P. Agrawal, G. P. (2006). In Guided Wave Optical Components and Devices. B. P. Pal, ed., Academic Press, Boston, ch.7.
- Yamashida S., and Hotala, K., (1992). Multiwavelength erbium-doped fibre laser using intracavity elaton and cooled by liquid nitrogen., Electron Lett. 32 : 1298–1299.
- Yang, X., Dong, X., Zhang, S., Lu, F., Zhou, X. and Lu, C. Multi-wavelength erbium-doped fibre laser with 0.8-nm spacing using sampled Bragg grating and photonic crystal fibre., IEEE Photonics Technol. Lett., 17: 2538–2540.
- Yang J.H., Dai S.X., Zhou Y.F., Wen L., HuL. L., Jiang Z.H. (2004). Optical transitions and upconversion luminescence of $\text{Er}^{3+}/\text{Yb}^{3+}$ codoped halide modified tellurite glasses., J. Appl. Phys. 95: 3020.
- Yariv A., Fekete D. and Pepper D. M. (1979). Compensation of channel dispersion by nonlinear optical phase conjugation., Optics Letters, 4: 52-54.
- Yeniay A., Delavaux M.-M., and Toulouse J. (2002). Spontaneous and stimulated brillouin scattering gain spectra in optical fibres., J. Lightwave Tech., 20(8) : 1425-1432.
- Yong-Geun Han, T.V.A. Tran, Sang-Hyuck Kim and Sang Bae Lee, (2005). Multi-wavelength Raman-fibre-laser-based long-distance remote sensor for simultaneous measurement of strain and temperature., Opt. Lett. 30 : 1282-1284.
- Youn gjae Kim, Serge Doucet, Sophie LaRochelle, (2008). 50-Channel 100-GHz-Spaced Multiwavelength Fibre Lasers With Single-Frequency and Single-Polarization Operation., IEEE Photon. Technol. Lett. 20 (20): 1718.
- YuB., KimD. andB. Lee (2001). Multiwavelength pulse generation in semiconductor-fibre ring laser using a sampled fibre grating., Optics Communications, 200(1-6): 343-347.
- Yulin, A.V., Skryabin, D., Russell, P.S.J. (2004). Four-wave mixing of linear waves and solitons in fibres with higher-order dispersion., Opt. Lett. 29: 2411-2413.

Yusoff, Z. (2004). application of highly nonlinear holey fibres in optical communications.Thesis for the degree of Doctor of Philosophy.

Zhan, L., Ji, J. H., Xia, J., Luo, S. Y. and Xia, Y. X. (2005a). 160-line multiwavelength generation of linear cavity self-seeded Brillouin-Erbium fibre laser., Opt. Express, 14: 10233-10238.

Zhan, L., Li, J. H., Xia, J., Luo S. Y. and Xia, Y. X. (2006a). 160-line multi-wavelength generation of linear-cavity self-seeded Brillouin-Erbium fibre laser., Optics Express, 14 (22): 10233-10238.

Zhang, A. L., Liu, H., Demokan, M. S. and Tam, H. Y. (2005). Stable and broad bandwidth multi-wavelength fibre ring laser incorporating a highly nonlinear photonic crystal fibre., IEEE Photon. Technol. Lett. 17: 2535- 2537.

Zhang, L., Demokan, M. S., and Tam, H. Y. (2006). Room temperature multiwavelength erbium-doped fibre ring laser using a highly nonlinear photonic crystal fibre., Opt. Commun. 260: 670-674.

Zhao J., Liao T., Yang X., Tong Z. and Liu Y. (2010). Simple tunable multiwavelengthBrillouin-erbium fibre ring laser with lowthreshold power.,J. Opt. 12: 115202.

Zou L., Bao X. and Chen L. (2005). Distributed Brillouin temperature sensing in photonic crystal fibre., Smart Mater. Struct. 14: S8–S11.

Appendix A

List of the publication

A1. Journal Papers

1. Ahmad, H., **Parvizi, R.**, Ali, N. M., Shahabuddin, N. S., Arof, H., & Harun, S. W. (2011). Investigation on stimulated Brillouin scattering effect in photonic crystal fibre. *Microwave and Optical Technology Letters*, 53(6), 1450-1453.
2. Ahmad, H., **Parvizi, R.**, Dimyati, K., Tamjis, M. R., & Harun, S. W. (2010). FWM-Based Multi-Wavelength Erbium-Doped Fibre Laser Using Bi-EDF. *Laser Physics*, 20(6), 1414-1417.
3. Ahmad, H., **Parvizi, R.**, Shahabuddin, N. S., Yusoff, Z., & Harun, S. W. (2010). Effect of gain medium on the performance of Brillouin fibre laser. *Microwave and Optical Technology Letters*, 52(9), 2158-2160.
4. Cheng, X. S., **Parvizi, R.**, Ahmad, H., & Harun, S. W. (2009). Wide-Band Bismuth-Based Erbium-Doped Fibre Amplifier With a Flat-Gain Characteristic. *IEEE Photonics Journal*, 1(5), 259-264.
5. Harun, S. W., **Parvizi, R.**, Cheng, X. S., Parvizi, A., Emami, S. D., Arof, H., et al. (2010). Experimental and theoretical studies on a double-pass C-band bismuth-based erbium-doped fibre amplifier. *Optics and Laser Technology*, 42(5), 790-793.
6. Harun, S. W., **Parvizi, R.**, Shahabuddin, N. S., Yusoff, Z., & Ahmad, H. (2010). Semiconductor optical amplifier-based multi-wavelength ring laser utilizing photonic crystal fibre. *Journal of Modern Optics*, 57(8), 637-640.

7. Harun, S. W., **Parvizi, R.**, Shahi, S., & Ahmad, H. (2009a). Compact Bi-EDF-Based Brillouin Erbium Fibre Laser Operating at the 1560-nm Region. *IEEE Photonics Journal*, 1(5), 254-258.
8. Harun, S. W., **Parvizi, R.**, Shahi, S., & Ahmad, H. (2009b). Multi-wavelength erbium-doped fibre laser assisted by four-wave mixing effect. *Laser Physics Letters*, 6(11), 813-815.
9. **Parvizi, R.**, Ali, N. M., Harun, S. W., & Ahmad, H. (2011). Architecture of a Dual-Wavelength Brillouin Fibre Laser Based on a Photonic Crystal Fibre with Dual-Pass Amplification Configuration. *Lasers in Engineering*, 21(3-4), 209-216.
10. **Parvizi, R.**, Ali, N. M., Harun, S. W., Moghavvemi, M., Arof, H., & Ahmad, H. (2011). Multi-wavelength Brillouin fibre laser using dual-cavity configuration. *Laser Physics*, 21(1), 205-209.
11. **Parvizi, R.**, Arof, H., Ali, N. M., Ahmad, H., & Harun, S. W. (2011). 0.16 nm spaced multi-wavelength Brillouin fibre laser in a figure-of-eight configuration. *Optics and Laser Technology*, 43(4), 866-869.
12. **Parvizi, R.**, Harun, S. W., Ali, N. M., & Ahmad, H. (2010). Investigation on stimulated Brillouin scattering characteristics in a highly doped Bismuth-based Erbium-doped fibre. *Laser Physics*, 20(11), 1973-1977.
13. **Parvizi, R.**, Harun, S. W., Ali, N. M., Shahabuddin, N. S., & Ahmad, H. (2011). Photonic crystal fibre-based multi-wavelength Brillouin fibre laser with dual-pass amplification configuration. *Chinese Optics Letters*, 9(2).
14. **Parvizi, R.**, Harun, S. W., Shahabuddin, N. S., Yusoff, Z., & Ahmad, H. (2010). Multi-wavelength bismuth-based erbium-doped fibre laser based on four-wave mixing effect in photonic crystal fibre. *Optics and Laser Technology*, 42(8), 1250-1252.

15. **Parvizi, R.**, Emami, S. D., Shahi, S., Harun, S. W., & Ahmad, H. (2009). Experimental and theoretical studies on C-band bismuth-based erbium doped fibre amplifier. *Optoelectronics and Advanced Materials-Rapid Communications*, 3(10), 971-974.

A2. Conference Papers

1. **Parvizi, R.**, Ali, N. M., Harun, S. W., & Ahmad, H. (2010). Numerical Modelling of C-Band Bismuth-Based Erbium Doped Amplifier. *Malaysia Annual Physics Conference 2010 (Perfik-2010)*, 1328, 127-129.
2. Osman, S. S., Harun, S. W., **Parvizi, R.**, Ahmad, H., & Ieee. (2009). An Efficient Double-Pass Bismuth-based Erbium-Doped Fibre Amplifier. *2009 International Conference for Technical Postgraduates (Techpos 2009)*, 355-357.
3. Ali, N. M., **Parvizi, R.**, Harun, S. W., & Ahmad, H. (2010). 20 GHz Optical Combs Generation in Brillouin Fibre Laser with a Compact Ring Cavity. *Malaysia Annual Physics Conference 2010 (Perfik-2010)*, 1328, 130-132.

Appendix B

Selected Papers

In this appendix, some of the various publications used to do this research are presented. These publications were obtained from the research data directly related to this work. I hope this appendix help to the readers of this work.