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LIST OF SELECTED PUBLICATIONS

Edited Special Issues and NDES Proceedings

- [1] G. Kolumbán, guest editor. Special issue on “Intelligent Systems, INTER-ACADEMIA.” *Periodica Polytechnica, Electrical Engineering*, vol. 50, no. 3–4, 2006.
- [2] C. K. Tse, G. Kolumbán and F. C. M. Lau, guest editors. Special Issue on “Application of Chaos in Communications.” *Circuits, Systems and Signal Processing*, vol. 24, no. 5, September–October 2005.
- [3] M. P. Kennedy and G. Kolumbán, guest editors. Special issue on “Noncoherent Chaotic Communications.” *IEEE Trans. Circuits and Syst. I*, vol. 47, no. 12, December 2000.
- [4] G. Kolumbán, editor. *Proc. of the 6th International Specialist Workshop on Nonlinear Dynamics of Electronic Systems, (NDES'98)*. Technical University of Budapest, Budapest, Hungary, July 16–18, 1998.

Book chapters

- [1] G. Kolumbán, T. Krébesz, C. K. Tse and F. C. M. Lau, “Basics of Communications Using Chaos,” in *Chaotic Signals in Digital Communications*, M. Eisenkraft, R. Attux and R. Suyama, Eds., chap. 4, pp. 111–142. CRC Press, Taylor & Francis Group, LLC, 2013.
- [2] G. Kolumbán and T. Krébesz, “Chaotic Communications with Autocorrelation Receiver: Modeling, Theory and Performance Limits,” in *Intelligent Computing Based on Chaos*, L. Kocarev, Z. Galias and S. Lian, Eds., chap. 6, pp. 121–143. Springer-Verlag, Berlin Heidelberg, 2009.
- [3] G. Kolumbán, “Phase-Locked Loops,” in *The Encyclopedia of RF and Microwave Engineering*, K. Chang, Ed., vol. 4, pp. 3735–3767. Wiley, New York, 2005.
- [4] G. Kolumbán and M. P. Kennedy, “Correlator-Based Chaotic Communications: Attainable Noise and Multipath Performance,” in *Chaos in Circuits and Systems*, G. Chen and T. Ueta, Eds. World Scientific, Series on Nonlinear Science, Series B –vol. 11, pp. 443–485, Singapore, 2002.
- [5] G. Kolumbán and M. P. Kennedy, “Overwiev of Digital Communications,” in *Chaotic Electronics in Telecommunications*, M. P. Kennedy, R. Rovatti, and G. Setti, Eds., pp. 131–149. CRC Press LLC, Florida, 2000.

- [6] M. P. Kennedy, G. Kolumbán, and Z. Jákó, “Chaotic Modulation Schemes,” in *Chaotic Electronics in Telecommunications*, M. P. Kennedy, R. Rovatti, and G. Setti, Eds., pp. 151–183. CRC Press LLC, Florida, 2000.
- [7] G. Kolumbán, M. P. Kennedy, and G. Kis, “Performance Evaluation of FM-DCSK,” in *Chaotic Electronics in Telecommunications*, M. P. Kennedy, R. Rovatti, and G. Setti, Eds., pp. 185–220. CRC Press LLC, Florida, 2000.
- [8] G. Kolumbán, “Phase-Locked Loops,” in *The Encyclopedia of Electrical and Electronics Engineering*, J. G. Webster, Ed., vol. 16, pp. 158–188. Wiley, New York, 1999.
- [9] M. P. Kennedy and G. Kolumbán, “Digital Communications Using Chaos,” in *Controlling Chaos and Bifurcations in Engineering Systems*, G. Chen, Ed., chapter 22, pp. 477–500. CRC Press LLC, Florida, 1999.
- [10] M. P. Kennedy and G. Kolumbán, “Communicating with Chaos,” in *The Electrical Engineering Handbook, CRCnetBASE CD*, R. C. Dorf, Ed., chapter 5.4, 16 pages. Chapman & Hall / CRCnetBASE, CRC Press LLC, Florida, 1999.

Refereed international journal papers

- [1] G. Kolumbán, “Software Defined Electronics: A Revolutionary Change in Design and Teaching Paradigm of RF Radio Communications Systems,” *ICT Express*, vol. 1, iss. 1, pp. 44-54, June 2015. Published online in ScienceDirect, Hosted by Elsevier: ‘<http://www.sciencedirect.com/science/article/pii/S2405959515300217>’, DOI: 10.1016/S2405-9595(15)30021-7.
- [2] Cs. M. Józsa, G. Kolumbán, A. M. Vidal, F. J. Martínez-Zaldívar and A. González, “Parallel Sphere Detector Algorithm Providing Optimal MIMO Detection on Massively Parallel Architectures,” *Concurrency and Computation: Practice and Experience*, April 30, 2015. Published online in Wiley Online Library: ‘<http://onlinelibrary.wiley.com/doi/10.1002/cpe.3488/abstract>’, DOI: 10.1002/cpe.3488.
- [3] W. K. Xu, L. Wang and G. Kolumbán, “A New Data Rate Adaption Communications Scheme for Code-Shifted Differential Chaos Shift Keying Modulation,” *International Journal of Bifurcation and Chaos*, vol. 22, no. 8, pp. 1250201/1–1250201/8, August 2012.
- [4] G. Kolumbán, T. Krébesz and F. C. M. Lau, “Theory and Application of Software Defined Electronics: Design Concepts for the Next Generation of Telecommunications and Measurement Systems,” *IEEE CAS Magazine*, vol. 12, no. 2, pp. 8–34, Second Quarter, 2012, invited paper.
- [5] W. K. Xu, L. Wang and G. Kolumbán, “A Novel Differential Chaos Shift Keying Modulation Scheme,” *International Journal of Bifurcation and Chaos*, vol. 21, no. 3, pp. 799–811, March 2011.
- [6] J. Julow, Zs. Kolumbán, Á. Viola, T. Major, and G. Kolumbán, “Prediction of Volumetric Change in the “Triple Ring” Caused by Glioma I-125 Brachytherapy,” *Neuro-Oncology*, vol. 10, no. 4, pp. 583–592, August 2008.
- [7] G. Kolumbán and T. Krébesz, “UWB Radio: Digital Communication with Chaotic and Impulse Wavelets,” *IEICE Trans. on Fundamentals of Electronics, Communications and Computer Sciences*, vol. E90-A, no. 10, pp. 2248–2249, October 2007.

- [8] S. K. Yong, C. C. Chong, and G. Kolumbán, “Non-Coherent UWB Radio for Low-Rate WPAN Applications: A Chaotic Approach,” *International Journal of Wireless Information Networks*, vol. 14, no. 2, pp. 121–131, June 2007.
- [9] Y. Xia, C. K. Tse, F. C. M. Lau and G. Kolumbán, “Performance of Frequency-Modulated Differential-Chaos-Shift-Keying Communication System Over Multipath Fading Channels with Delay Spread,” *International Journal of Bifurcation and Chaos*, vol. 15, no. 12, pp. 4027–4033, December 2005.
- [10] G. Kolumbán, F. C. M. Lau and C. K. Tse, “Generalization of Waveform Communications: The Fourier Analyzer Approach,” *Circuits, Systems and Signal Processing*, vol. 24, no. 5, pp. 451–477, September–October 2005.
- [11] F. C. M. Lau and G. Kolumbán, “Performance Limit of Chaotic Digital Waveform Communication Systems: Approach of Maximizing A Posteriori Probability,” *Circuits, Systems and Signal Processing*, vol. 24, no. 5, pp. 639–655, September–October 2005.
- [12] Z. Szabó and G. Kolumbán, “How to Avoid False Lock in SPLN Frequency Synthesizers,” *IEEE Trans. on Instrumentation and Measurement*, vol. 52, no. 3, pp. 927–931, June 2003.
- [13] G. Kolumbán, M. P. Kennedy, Z. Jákó, and G. Kis, “Chaotic Communications with Correlator Receiver: Theory and Performance Limit,” *Proceedings of the IEEE*, vol. 90, no. 5, pp. 711–732, May 2002, invited paper.
- [14] G. Kolumbán and M. P. Kennedy, “The Role of Synchronization in Digital Communication Using Chaos—Part III: Performance Bounds,” *IEEE Trans. Circuits and Syst. I*, vol. 47, no. 12, pp. 1673–1683, December 2000.
- [15] G. Kolumbán, “Theoretical Noise Performance of Correlator-Based Chaotic Communications Schemes,” *IEEE Trans. Circuits and Syst. I*, vol. 47, no. 12, pp. 1692–1701, December 2000.
- [16] M. P. Kennedy, G. Kolumbán, G. Kis, and Z. Jákó, “Performance Evaluation of FM-DCSK Modulation in Multipath Environments,” *IEEE Trans. Circuits and Syst. I*, vol. 47, no. 12, pp. 1702–1711, December 2000.
- [17] Z. Jákó, G. Kolumbán, and H. Dedieu, “On Some Recent Developments of Noise Cleaning Algorithms for Chaotic Signals,” *IEEE Trans. Circuits and Syst. I*, vol. 47, no. 9, pp. 1403–1407, September 2000.
- [18] M. P. Kennedy and G. Kolumbán, “Digital Communications Using Chaos,” *Signal Processing*, vol. 80, no. 7, pp. 1307–1320, July 2000.
- [19] M. P. Kennedy, G. Kolumbán, and G. Kis, “Chaotic Modulation for Robust Digital Communications over Multipath Channels,” *International Journal of Bifurcation and Chaos*, vol. 10, no. 4, pp. 695–718, April 2000, invited paper.
- [20] B. A. Frigiyik and G. Kolumbán, “Phenomenological Model of the Sampling Phase-Locked Loop with False Lock,” *Journal of Signal Processing*, Special Issue on Nonlinear Signal Processing, vol. 4, pp. 99–103, January 2000.
- [21] G. Kolumbán, M. P. Kennedy, and L. O. Chua, “The Role of Synchronization in Digital Communication Using Chaos—Part II: Chaotic Modulation and Chaotic Synchronization,” *IEEE Trans. Circuits and Syst. I*, vol. 45, no. 11, pp. 1129–1140, November 1998.

- [22] G. Kolumbán, G. Kis, Z. Jákó, and M. P. Kennedy, “FM-DCSK: A Robust Modulation Scheme for Chaotic Communications,” *IEICE Trans. Fundamentals of Electronics, Communications and Computer Sciences*, vol. E81–A, no. 9, pp. 1798–1802, September 1998.
- [23] B. Vizvári and G. Kolumbán, “Quality Evaluation of Random Numbers Generated by Chaotic Sampling Phase-Locked Loops,” *IEEE Trans. Circuits and Syst. I*, vol. 45, no. 3, pp. 216–224, March 1998.
- [24] G. Kolumbán, M. P. Kennedy, and L. O. Chua, “The Role of Synchronization in Digital Communication Using Chaos—Part I: Fundamentals of Digital Communications,” *IEEE Trans. Circuits and Syst. I*, vol. 44, no. 10, pp. 927–936, October 1997.
- [25] G. Kolumbán and B. Vizvári, “Nonlinear Dynamics and Chaotic Behavior of the Sampling Phase-Locked Loop,” *IEEE Trans. Circuits and Syst. I*, vol. 41, no. 4, pp. 333–337, April 1994.

Patents Granted

- [1] G. Kolumbán, M. P. Kennedy, G. Kis, and Z. Jákó, “Binary Digital Communication System Using a Chaotic Frequency-Modulated Carrier,” Irish patent number: S80913, granted on June 16, 1999.
- [2] G. Kolumbán, G. Szarka and M. Krasovics, “Phase Detector and Frequency Synthesizer Configurations for Single Channel per Carrier-Type Satellite Communications Systems,” Hungarian patent number: 205-505, granted on October 26, 1988.
- [3] G. Kolumbán, M. Krasovics, and G. Szarka, “Lock Indicator Configuration for Phase-Locked Loops Operating over Very Wide Region of Phase Error,” Hungarian patent number: 204-940, granted on April 6, 1988.
- [4] G. Kolumbán, I. Sal, S. Király, G. Kósa, and K. Visegrádi, “AFC Circuit Configuration for Quartz-Stable Microwave Local Oscillator with FM Modulation Capability,” Hungarian patent number: 181-811, granted on June 9, 1980.
- [5] I. Sal and G. Kolumbán, “Circuit Configuration for Quartz Oscillator with Extremely High Stability and Spectral Purity,” Hungarian patent number: 174-247, granted on August 5, 1977.
- [6] V. Bíró, G. Kolumbán, and K. Visegrádi, “Circuit Configuration for Stabilizing the Output Power of Microwave Frequency Multipliers,” Hungarian patent number: 174-248, granted on June 8, 1977.

Invited tutorials and keynote addresses

- [1] G. Kolumbán, “University Ivory Tower: To Stay in or Break Out, SDE: A Direct Jump from Scientific Research to Industrial Applications,” invited plenary talk at *2015 International Symposium on Nonlinear Theory and its Applications*, Hong Kong SAR, China, December 1–4, 2015, in *Proc. NOLTA’15*, pp. 756–768.
- [2] G. Kolumbán, “New Approach for Design and Implementation of Future Communications Systems,” invited keynote speech at *2014 International Symposium on System-on-Chip (SoC)*, October 28, 2014, Tampere, Finland.

- [3] G. Kolumbán, “Software Defined Electronics (SDE): A Revolutionary Change in Design Paradigm of RF Radio and Measurement Systems,” invited plenary talk at *14th International Symposium on Communications and Information Technologies (ISCIT)*, September 24, 2014, Incheon, Korea.
- [4] G. Kolumbán, “Software Defined Electronics: A Revolutionary Change in Design Paradigm of RF Radio and Measurement Systems,” invited tutorial at *International Telecommunications Symposium (ITS)*, August 17, 2014, São Paulo, Brazil.
- [5] G. Kolumbán, “Software Defined Electronics: A New Research Field for Circuits and Systems Society,” invited keynote talk at *12th IEEE International New Circuits And Systems (NEWCAS) Conference*, June 24, 2014, Trois-Rivières, Canada.
- [6] G. Kolumbán, “SDE: A Revolutionary New Approach for Design and Implementation of Future Communications Systems,” invited keynote talk at *IEEE International Symposium on Computer, Consumer and Control (IS3C)*, June 10, 2014, Taichung, Taiwan.
- [7] G. Kolumbán, F. C. M. Lau and C. K Tse, “UWB Radio: From an Idea to Implementations,” invited tutorial at *2010 IEEE International Conference on Ultra-Wideband (ICUWB)*, Nanjing, China, September 20–23, 2010.
- [8] G. Kolumbán, “Feasibility of UWB radio: Dreams, Facts and Solutions,” invited speech at *IEEE International Symposium on Communications and Information Technologies (ISCIT)*, Incheon, Korea, September 28–30, 2009.
- [9] G. Kolumbán and T. Krébesz, “LR-WPAN and UWB Data Communication Systems: A New Possible Application for Chaotic Carriers,” invited talk at *International Workshop on Nonlinear Maps and their Applications (NOMA)*, University de Toulouse, LATTIS–INSA Toulouse, France, December 13–14, 2007, in *Proc. NOMA ’07*, pp. 32–35.
- [10] G. Kolumbán, “Performance Bounds on Chaos Communications: A Systematic Approach to the Development of a Chaotic Communication System,” keynote talk at *Workshop on the Transmission of Chaotic Signals*, University of Bristol, UK, August 1–3, 2006.
- [11] G. Kolumbán, “Ultra-Wideband Radio: Chaotic Communications versus Noncoherent Impulse Radio,” invited tutorial at *European Conference on Circuit Theory and Design (ECTD)*, University College Cork, Ireland, September 1–2, 2005.
- [12] G. Kolumbán, “The Theory and Implementation of a Robust Chaotic Digital Communications System,” invited tutorial at *2003 Microwave Symposium Workshop* organized at IEEE International Microwave Symposium, Philadelphia, USA, June 9, 2003, online: “<http://www.ims2003.org/technical/workshop/WMA.htm>”.
- [13] G. Kolumbán, “The Theory and Implementation of a Robust Chaotic Digital Communications System,” invited talk at *Winter School 2002* organized by the UCSD/UCLA/Stanford ARO MURI Program in Chaotic Communications, University of California, San Diego, USA, January 13–16, 2002, online: “<http://rfic.ucsd.edu/chaos/ws2002/Kolumban.pdf>”.
- [14] M. P. Kennedy and G. Kolumbán, “Chaotic Modulations: From BCSK to FM-DCSK,” presymposium tutorial at *IEEE International Symposium on Circuits and Systems (ISCAS)*, Geneva, Switzerland, May 28–31, 2000.

- [15] G. Kolumbán and M. P. Kennedy, “DCSK: Chaotic Modulation for Multipath Environments,” presymposium tutorial at *IEEE International Symposium on Circuits and Systems (ISCAS)*, Geneva, Switzerland, May 28–31, 2000.
- [16] G. Kolumbán and M. P. Kennedy, “Performance Comparison of FM-DCSK and Conventional Modulation Schemes in Multipath Environment,” invited keynote address at *Nonlinear Dynamics of Electronic Systems (NDES)*, Rønne, Island of Bornholm, Denmark, July 15–17, 1999, in *Proc. NDES’99*, pp. 151–156.
- [17] G. Kolumbán, “Performance Evaluation of Chaotic Communications Systems: Determination of Low-Pass Equivalent Model,” invited tutorial at *Nonlinear Dynamics of Electronic Systems (NDES)*, Budapest, Hungary, July 16–18, 1998, in *Proc. NDES’98*, pp. 41–51.

Invited DLP lectures delivered in the framework of IEEE CAS Distinguished Lecturer Program, 2013-14

- [1] G. Kolumbán, “Software Defined Electronics: A Revolutionary New Approach for the Design and Implementation of Future RF Band-Pass Systems,” Short DLP course at Beijing Jiaotong University, December 2014, Beijing, China.
- [2] G. Kolumbán, “Software-Defined Electronics: A New Research Field for CAS Society,” Half-day DLP tutorial at *NORCHIP 2014*, October 27, 2014, Tampere, Finland.
- [3] G. Kolumbán, “Software Defined Electronics: A Revolutionary New Paradigm for the Research and Design of Future Communications and Measurement Systems,” DLP seminar at City University of Hong Kong and The Hong Kong Polytechnic University, October 10, 2014, Hong Kong.
- [4] G. Kolumbán, “Software Defined Electronics (SDE): A Revolutionary Change in Design Paradigm of Radio and RF Measurement Systems,” Short DLP course at Inha University, September 23, 2014, Incheon, Korea.
- [5] G. Kolumbán, “Software Defined Electronics (SDE): A New Approach for Design and Implementation of Future Communications Systems,” Short DLP course at Universidade do Estado do Rio de Janeiro (UERJ), August 15, 2014, Rio de Janeiro, Brazil.
- [6] G. Kolumbán, “New Approach for Design and Implementation of Future Communications Systems,” DLP lecture at Tokyo University of Science, December 13, 2013, Tokyo, Japan.
- [7] G. Kolumbán, “Software Defined Electronics: A New Research Field for CAS Society,” DLP lecture at Meiji University, December 11, 2013, Tokyo, Japan.
- [8] G. Kolumbán, “Software Defined Electronics: A New Research Field for CAS Society,” DLP lecture at Tokushima University, December 04, 2013, Tokushima, Japan.
- [9] G. Kolumbán, “Implementation of SDE-Based Universal RF Testbed and Derivation of Baseband Equivalents,” DLP lecture *CAMTA Day*, Facultad Regional Buenos Aires - Universidad Tecnológica Nacional, Buenos Aires, August 15, 2013 Buenos Aires, Argentina.
- [10] G. Kolumbán, “Software Defined Electronics: A New Approach for Design and Implementation of Future Communications Systems,” DLP short course at *EAMTA*, Facultad Regional Buenos Aires - Universidad Tecnológica Nacional, August 12 and 14, 2013, Buenos Aires, Argentina.

- [11] G. Kolumbán, “Software Defined Electronics: A Revolutionary Design Paradigm for Automated Calibration and Test Systems,” DLP seminar at Beijing Jiaotong University, May 12, 2013, Beijing, China.
- [12] G. Kolumbán, “Software Defined Electronics: A Revolutionary Paradigm for RF Radio and Measurement Systems,” A day-long DLP short course organized by IEEE UK&RI Solid State Circuits Chapter, Tyndall National Institute, May 09, 2013, Cork, Ireland.
- [13] G. Kolumbán, “Software Defined Electronics: A New Research Field for the IEEE CAS Society” DLP seminar at Guangdong University of Technology, April 09, 2013, Guangzhou, China.