Optics and Spectroscopy (English translation of Optika i Spektroskopiya) 2017 vol.122 N5, pages 687-691

An evolutionary particle swarm optimization algorithm for mathematical processing of experimental spectra

Kamalova D., Galimullin D., Sibgatullin M., Salakhov M.

Kazan Federal University, 420008, Kremlevskaya 18, Kazan, Russia

Abstract

© 2017, Pleiades Publishing, Ltd.A particle swarm optimization algorithm is applied for mathematical treatment of Fourier-transform IR spectra of branched copolymers of methyl methacrylate. The efficiency of reconstruction of the spectra using the particle swarm optimization algorithm as compared with the least squares method is illustrated by the example of decomposition of a six-component experimental spectrum.

http://dx.doi.org/10.1134/S0030400X17050101

References

[1] C. Reynolds, Comput. Graph. 21, 25 (1987). doi 10.1145/37402.37406

[2] J. Kennedy and R. C. Eberhart, in Proceedings of the IEEE International Conference on Neural Networks, Perth, Australia (IEEE Service Center, Piscataway, NJ, 1995), Vol. 4, p. 1942. doi 10.1109/ICNN.1995. 488968

[3] C. Y. Liu, C. Q. Yan, and J. J. Wang, Ann. Nuclear Energy 64, 276 (2014). doi 10.1016/j.anucene.2013.05.044

[4] C.-J. Ting, K.-C. Wu, and H. Chou, Expert Syst. Appl. 41, 1543 (2014). doi 10.1016/j.eswa.2013.08.051

[5] Z. Beheshti and S. M. H. Shamsuddin, Inform. Sci. 258, 54 (2014). doi 10.1016/j.ins.2013.08.015

[6] T. Y. Ji, Z. Lu, and Q. H. Wu, Signal Process. 87, 2799 (2007). doi 10.1016/j.sigpro.2007.05.024

[7] D. Z. Galimullin, M. E. Sibgatullin, D. I. Kamalova, and M. Kh. Salakhov, Bull. Russ. Acad. Sci.: Phys. 78, 210 (2014). doi 10.3103/S1062873814030083

[8] A. Krizhevsky, I. Sutskever, and G. E. Hinton, Adv. Neural Inform. Process. Syst. 1, 1097 (2012).

[9] Shuiwang Ji, Wei Xu, Ming Yang, and Yu. Kai, IEEE Trans. Pattern Anal. Machine Intell. 35, 221 (2013). doi 10.1109/TPAMI.2012.59

[10] G. E. Hinton and R. R. Salakhutdinov, Science 313 (5786), 504 (2006). doi 10.1126/science.1127647

[11] S. V. Kurmaz and V. V. Ozhiganov, Polymer Sci., Ser. A 53, 232 (2011).

[12] D. I. Kamalova, A. B. Remizov, and M. Kh. Salakhov, Conformation Probes in the Study of Local Mobility of Polymers (Fizmatkniga, Moscow, 2008) [in Russian].

[13] S. S. Kharintsev, D. Z. Galimullin, A. Yu. Vorob'ev, and M. Kh. Salakhov, Spectrochim. Acta, Part A 65, 292 (2006).

[14] A. Kh. Kuptsov and G. N. Zhizhin, Handbook of Fourier Transform Raman and Infrared Spectra of Polymers (Fizmatlit, Moscow, 2001) [in Russian].

[15] D. I. Kamalova, D. Z. Galimullin, M. E. Sibgatullin, E. R. Shaimukhametova, and M. Kh. Salakhov, Opt. Spectrosc. 114, 41 (2013). doi 10.1134/S0030400X1301013X

[16] M. Taherkhani and R. Safabakhsh, Appl. Soft Comput. 38, 281 (2016). doi 10.1016/j.asoc.2015.10.004