Abstract for 28 October 2017, Hualien, Taiwan

Self-organizing patterns for digital image hiding and communication

Prof. Minvydas Ragulskis
Kaunas University of Technology, Lithuania

The science of pattern formation focuses on the laws governing the formation of such visual images which mimic the evolution of self-organizing patterns in nature. Pattern formation in biology (animal markings, growth of colonies, cancer dynamics), chemistry (reaction-diffusion systems, Turing patterns), physics (liquid crystals, granular material), computer graphics (cellular automata, texture analysis) attracts the attention of researchers since the middle of the twentieth century.

This lecture will give an overview on recent developments in the field of applications of self-organizing patterns in digital image hiding and communication. We will start from a secure steganographic communication algorithm based on the predator-prey type model with self- and cross-diffusion, and continue towards advanced communication techniques based on the atrial fibrillation model and the breakup of spiral waves.

The advantage of steganography, over cryptography alone, is that messages do not attract attention to themselves. Therefore, whereas cryptography protects the content of a message, steganography can be said to protect both messages and communicating parties. This lecture demonstrates that self-organizing patterns can be exploited as an effective tool for steganographic communication.