Караваев Анатолий Сергеевич
д.ф.-м.н., доцент

- С.н.с. СФ ИРЭ им В.А. Котельникова РАН,
- В.н.с. лаборатории «умного сна»,
- Профессор кафедры динамического моделирования и биомедицинской инженерии СГУ им. Н.Г. Чернышевского,
- В.н.с. отдела продвижения новых кардиологических информационных технологий СГМУ им. В.И. Разумовского

Научные интересы:
- Методы обработки и анализа сигналов сложных систем
- Математическое моделирование биологических систем
- Радиофизические устройства регистрации и анализа сигналов биологических объектов
- Разработка программного обеспечения для персональных компьютеров и цифровых сигнальных процессоров (C/C++, Delphi, Python, JavaScript, Assembler, Matlab и др.)

Принимал участие в выполнении большого числа научных проектов, включая гранты фондов РНФ, РФФИ, Президента РФ, CRDF, федеральной целевой программы. Является соавтором более 250 научных работ, а также коллективных монографий: Prokhorov M.D., Ponomarenko V.I., Karavaev A.S., Bezruchko B.P. Recovery of dynamical models of time-delay systems from time series: Application to chaotic communication // in "Nonlinear Phenomena Research Perspectives", Ed. Wang C.W. Nova Science Publishers Inc. New York. 2007. P 7-53; Пономаренко В.И., Прохоров М.Д., Караваев А.С., Безручко Б.П. Системы с запаздыванием (реконструкция моделей и их приложение) / Саратов: Изд-во Саратовского университета, 2016. — 328 с.

Индекс Хирша h=27 (РИНЦ), h=12 (Web of Science / Scopus).

Основные публикации:

1. Karavaev A.S., Borovik A.S., Borovkova E.I., Orlova E.A., Simonyan M.A., Ponomarenko V.I., Skazkina V.V., Gridnev V.I., Bezruchko B.P., Prokhorov M.D., Kiselev A.R. Low-frequency component of photoplethysmogram reflects the autonomic control of blood pressure // Biophysical Journal. 2021. V. 120. P. 2657–2664
2. Prokhorov M.D., Karavaev A.S., Ishbulatov Y.M., Ponomarenko V.I., Kiselev A.R., Kurths J. Interbeat interval variability versus frequency modulation of heart rate // Physical Review E 2021. V. 103. P. 042404-14
3. Kiselev A.R., Borovkova E.I., Shvartz V.A., Skazkina V.V., Karavaev A.S., Prokhorov M.D., Ispiryan A.Y., Mironov S.A., Bockeria O.L. Low-frequency variability in photoplethysmographic waveform and heart rate during on-pump cardiac surgery with or without cardioplegia // Scientific Reports. 2020. V. 10. P. 2118
4. Runnova A., Zhuravlev M., Ukolov R., Blokhina I., Dubrovski A., Lezhnev N., Sitnikova E., Saranceva E., Kiselev A., Karavaev A., Selskii A., Semyachkina- Glushkovskaya O., Penzel T., Kurths J. Modified wavelet analysis of ECoG- pattern as promising tool for detection of the blood–brain barrier leakage // Scientific Reports (2021) 11:18505 https://doi.org/10.1038/s41598-021-97427-9
5. Ponomarenko V.I., Karavaev A.S., Borovkova E.I., Hramkov A.N., Kiselev A.R., Prokhorov M.D., Penzel T. Decrease of coherence between the respiration and parasympathetic control of the heart rate with aging // CHAOS. 2021. V. 31. P. 073105
6. Karavaev A.S., Ishbulatov Yu.M., Ponomarenko V.I., Bezruchko B.P., Kiselev A.R., Prokhorov M.D. Autonomic control is a source of dynamical chaos in the cardiovascular system // Chaos. 2019. V. 29, P. 121101.
7. Kiselev A.R., Karavaev A.S. The intensity of oscillations of the photoplethysmographic waveform variability at frequencies 0.04–0.4 Hz is effective marker of hypertension and coronary artery disease in males // Blood Pressure. 2020. V.29. Iss. 1. P. 55-62
8. Karavaev A.S., Kiselev A.R., Runnova A.E., Zhuravlev M.O., Borovkova E.I., Prokhorov M.D., Ponomarenko V.I., Pchelintseva S.V., Efremova T.Yu., Koronovskii A.A., Hramov A.E. Synchronization of infra-slow oscillations of brain potentials with respiration // Chaos. 2018. V. 28. P. 081102
9. Karavaev A.S., Ishbulatov J.M., Ponomarenko V.I., Prokhorov M.D., Gridnev V.I., Bezruchko B.P., Kiselev A.R. Model of human cardiovascular system with a loop of autonomic regulation of the mean arterial pressure // Journal of the American Society of Hypertension. 2016. V. 10. Iss. 3. P. 235-243.

10. Kiselev A.R., Mironov S.A., Karavaev A.S., Kulminskiy D.D., Skazkina V.V., Borovkova E.I., Shvartz V.A., Ponomarenko V.I., Prokhorov M.D. A comprehensive assessment of cardiovascular autonomic control using photoplethysmograms recorded from earlobe and fingers // Physiological Measurement. 2016. V. 37. P. 580-595.
11. Karavaev A.S., Prokhorov M.D., Ponomarenko V.I., Kiselev A.R., Gridnev V.I., Ruban E.I. and Bezruchko B.P. Synchronization of low-frequency oscillations in the human cardiovascular system // Chaos. 2009. V. 19. P. 033112.
12. Bezruchko B.P., Karavaev A.S., Ponomarenko V.I., Prokhorov M.D. Reconstruction of time-delay systems from chaotic time series // Physical Review E. 2001. V. 64. P. 056218

Karavaev Anatoly
PhD (Doctor of Science in Physics and Mathematics)

- Senior Researcher of Saratov Branch of the Institute of RadioEngineering and Electronics of Russian Academy of Sciences
- Leading Researcher of «Smart Sleep» Laboratory
- Associate Professor of the Department of Dynamical Modeling and BioMedical Engineering, Saratov State University
- Leading Researcher of the Department of Innovative Cardiological Information Technology, Institute of Cardiological Research, Saratov State Medical University

Scientific interests:
Methods of data analysis of complex systems
Mathematical modeling of biological systems
Radiophysical devices for recording and analyzing signals of biological objects
Software development for personal computers and digital signal processors (C / C ++, Delphi, Assembler, Matlab, etc.)

He took part in the implementation of a large number of scientific projects, including grants from the RSF, RFBR, Foundation of the President of the Russian Federation; CRDF and other international funds, projects under federal target programs. He is a co-author of more than 250 scientific works, including a monograph: Prokhorov M.D., Ponomarenko V.I., Karavaev A.S., Bezruchko B.P. Recovery of dynamical models of time-delay systems from time series: Application to chaotic communication // in "Nonlinear Phenomena Research Perspectives", Ed. Wang C.W. Nova Science Publishers Inc. New York. 2007. P 7-53.

Hirsch Index h=11 (Web of Science / Scopus).

Main publications:

13. Kiselev A.R., Borovkova E.I., Shvartz V.A., Skazkina V.V., Karavaev A.S., Prokhorov M.D., Ispiryan A.Y., Mironov S.A., Bockeria O.L. Low-frequency variability in photoplethysmographic waveform and heart rate during on-pump cardiac surgery with or without cardioplegia // Scientific Reports. 2020. V. 10. P. 2118
14. Karavaev A.S., Ishbulatov Yu.M., Ponomarenko V.I., Bezruchko B.P., Kiselev A.R., Prokhorov M.D. Autonomic control is a source of dynamical chaos in the cardiovascular system // Chaos. 2019. V. 29, P. 121101.
15. Kiselev A.R., Karavaev A.S. The intensity of oscillations of the photoplethysmographic waveform variability at frequencies 0.04–0.4 Hz is effective marker of hypertension and coronary artery disease in males // Blood Pressure. 2020. V.29. Iss. 1. P. 55-62
16. Karavaev A.S., Kiselev A.R., Runnova A.E., Zhuravlev M.O., Borovkova E.I., Prokhorov M.D., Ponomarenko V.I., Pchelintseva S.V., Efremova T.Yu., Koronovskii A.A., Hramov A.E. Synchronization of infra-slow oscillations of brain potentials with respiration // Chaos. 2018. V. 28. P. 081102
17. Karavaev A.S., Ishbulatov J.M., Ponomarenko V.I., Prokhorov M.D., Gridnev V.I., Bezruchko B.P., Kiselev A.R. Model of human cardiovascular system with a loop of autonomic regulation of the mean arterial pressure // Journal of the American Society of Hypertension. 2016. V. 10. Iss. 3. P. 235-243.
18. Kiselev A.R., Mironov S.A., Karavaev A.S., Kulminskiy D.D., Skazkina V.V., Borovkova E.I., Shvartz V.A., Ponomarenko V.I., Prokhorov M.D. A comprehensive assessment of cardiovascular autonomic control using photoplethysmograms recorded from earlobe and fingers // Physiological Measurement. 2016. V. 37. P. 580-595.
19. Karavaev A.S., Prokhorov M.D., Ponomarenko V.I., Kiselev A.R., Gridnev V.I., Ruban E.I. and Bezruchko B.P. Synchronization of low-frequency oscillations in the human cardiovascular system // Chaos. 2009. V. 19. P. 033112.
20. Bezruchko B.P., Karavaev A.S., Ponomarenko V.I., Prokhorov M.D. Reconstruction of time-delay systems from chaotic time series // Physical Review E. 2001. V. 64. P. 056218