List of publications and presentations

V Bykov

April, 2022

Chapters in collective edited volumes

1. Bykov, V., Maas, U., **2011**, Hierarchy System Analysis and Reduction of Reacting Flow Models, Computational Science and High Performance Computing IV, Notes on Numerical Fluid, Mechanics and Multidisciplinary Design, v. 115/2011, pp. 233-252.

2. Bykov, V., Gol'dshtein, V., Maas, U., **2010**, Scaling Invariant Interpolation for Singularly Perturbed Vector Fields (SPVF), Lecture Notes in Computational Science and Engineering, Springer, Vol. **75**, pp. 106-130.

3. Maas, U., Bykov, V., Rybakov, A., Stauch, R., **2009**, Hierarchical Modelling of Combustion Processes, High Performance Computing on Vector Systems 2008, Springer, Vol. **4**, pp. 111-127.

4. Bykov, V., Goldfarb, I., Gol'dshtein, V., Sazhin, S., Sazhina, E., **2006**, Dynamic Decomposition of ODE Systems: Application to Modelling of Diesel Fuel Sprays. In 'Model Reduction and Coarse-Graining Approaches for Multiscale Phenomena', ed. by A.N. Gorban, N. Kazantzis, Y.G. Kevrekidis, H.C. Ottinger, C. Theodoropoulos. Springer, Berlin-Heidelberg-New York, pp. 81-97.

5. Bykov, V., Goldfarb, I., Gol'dshtein, V., **2005**, Multi-Scale Analysis of Pressure Driven Flames. In “Singular Perturbation and Hysteresis”, ed. by Michael P. Mortell, Robert E. O'Malley, Alexei Pokrovskii and Vladimir Sobolev. SIAM, chapter 9: pp. 257-297.

Referred articles in scientific journals

6. R.Scießl, V.Bykov, Ridge-based reaction zone characterisation in non-premixed flames (**2022**) Combustion and Flame, accepted, CNF_112135.

7. Stein, M., Bykov, V., Maas, M., Kuntz, C., Deutschmann, O., Modelling the decomposition of urea-water-solution in films and droplets under SCR conditions with chemistry in the liquid phase (**2022**) Journal of Heat and Fluid Flow, 94, 108936.
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8. Bykov, V., Koksharov, A., Kuznetsov, M., Zhukov, V.P., Hydrogen-oxygen flame acceleration in narrow open ended channels (**2022**) Combustion and Flame, 238, 111913.
DOI: 10.1016/j.combustflame.2021.111913

9. Mislavskii, V., Pestovskii, N., Tskhai, S., Kichatov, B., Gubernov, V., Bykov, V., Maas, U. Diffusive-thermal pulsations of burner stabilized methane-air flames (**2021**) Combustion and Flame, 234, 111638.
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10. Bykov, V., Shashidharan, S., Berszany, E., Gubernov, V., Maas, U. Model Reduction of Rich Premixed Hydrogen/air Oscillatory Flames by Global Quasi-Linearization (GQL) (**2021**) Combustion Science and Technology, in print, 1-18.
DOI: 10.1080/00102202.2020.1869729

11. Atakan, B., Kaiser, S.A., Herzler, J., Porras, S., Banke, K., Deutschmann, O., Kasper, T., Fikri, M., Schießl, R., Schröder, D., Rudolph, C., Kaczmarek, D., Gossler, H., Drost, S., Bykov, V., Maas, U., Schulz, C.Flexible energy conversion and storage via high-

temperature gas-phase reactions: The piston engine as a polygeneration reactor (**2020**), Renewable and Sustainable Energy Reviews, 133, art. no. 110264.
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12. Yu, C., Minuzzi, F., Bykov, V., Maas, U. Methane/Air Auto-Ignition Based on Global Quasi-Linearization (GQL) and Directed Relation Graph (DRG): Implementation and Comparison (**2020**) Combustion Science and Technology, 192 (9), pp. 1802-1824.
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13. Kichatov, B., Kolobov, A., Gubernov, V., Bykov, V., Maas, U. Combustion of rich hydrogen–air mixture stabilised near a cylindrical porous burner (**2020**) Combustion Theory and Modelling, 24 (4), pp. 650-665.
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14. Golda, P., Blattmann, A., Neagos, A., Bykov, V., Maas, U. Implementation problems of manifolds-based model reduction and their generic solution (**2020**) Combustion Theory and Modelling, 24 (3), pp. 377-406.
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16. Bykov, V., Cherkinsky, Y., Gol'dshtein, V., Krapivnik, N., Maas, U. Fast-slow vector fields of reaction-diffusion systems (**2020**) IMA Journal of Applied Mathematics (Institute of Mathematics and Its Applications), 85 (1), pp. 67-86.
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17. Yu, C., Minuzzi, F., Bykov, V., Maas, U. Methane/Air Auto-Ignition Based on Global Quasi-Linearization (GQL) and Directed Relation Graph (DRG): Implementation and Comparison **(2020)** Combustion Science and Technology, 192 (9), pp. 1804-1824.
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18. Nishad, K., Stein, M., Ries, F., Bykov, V., Maas, U., Deutschmann, O., Janicka, J., Sadiki, A. Thermal decomposition of a single Adblue® droplet including wall–film formation in turbulent cross-flow in an SCR system **(2019)** Energies, 12 (13), art. no. 2600.
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19. Bykov, V., Kiverin, A., Koksharov, A., Yakovenko, I. Analysis of transient combustion with the use of contemporary CFD techniques **(2019)** Computers and Fluids, 194, art. no. 104310.
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20. Gubernov, V.V., Bykov, V., Maas, U. The effect of dilution on the diffusive-thermal instability of the rich premixed hydrogen deflagration **(2019)** International Journal of Hydrogen Energy, 44 (21), pp. 11153-11160.
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22. Bykov, V., Gubernov, V.V., Maas, U. Mechanisms performance and pressure dependence of hydrogen/air burner-stabilized flames (**2018**) Mathematical Modelling of Natural Phenomena, **13** (6) 51.
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37. Bykov V., Neagos, A., Klimenko, A. and Maas U., **2015,** Hierarchical structure of slow manifolds of reacting flows, Zeitschrift für physikalische Chemie, **229**(6), 833-856.

38. Neagos, A., Bykov, V., Maas, U., **2014**, Study of extinction limits of diluted hydrogen-air counter-flow diffusion flames with the REDIM method, Comb. Sci and Tech., **186**: 1502–1516.

39. Bykov. V., Gol'dshtein, V., **2013**, Fast and Slow Invariant Manifolds for Chemical Kinetics, Computers & Mathematics with Applications, **65**(10), 1502-1515.

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47. Bykov, V., Gol'dshtein, V., Maas, U., **2008**, Simple Global Reduction Technique Based on Decomposition Approach, Combustion Theory and Modelling (CTM), **12** (2), 389-405.
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55. Bykov, V., Goldfarb, I., Gol'dshtein.V., **2003**, On one Asymptotical Approach to Pressure Driven Flames in Porous Media, Int. J. of Pure and Appl. Math., **9** (4), 403-418.
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57. Strassacker, C., Bykov, V., Maas, U. Reduced modeling of Flame-Wall-Interactions of premixed isooctane-air systems including detailed transport and surface reactions (**2021**) Proceedings of the Combustion Institute, 38 (1), pp. 1063-1070.
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Presentations of published papers at conferences/meetings

1 Modelling and model reduction of the evaporation and decomposition of droplets and films of urea-water solution in exhaust gas environment, Seminar on Dynamics of the reaction diffusion systems, P.N.Lebedev Physical Institute, Moscow (Russia), November 19, **2021**

2 Some aspects of modeling and reduction of reacting flow systems, School of Young Scientists, P.N.Lebedev Physical Institute, Moscow (Russia), November 16-18, **2021**

3 Chemical kinetics - from the time scales to the hierarchy of models and their reduction, II International Workshop and School of Young Scientists, Vladivostok, (Russia), September 27 – October 1, **2021**

4 Hydrogen-oxygen flame acceleration in narrow open ended channels, Seminar on the dynamics of reacting systems, P.N.Lebedev Physical Institute, Moscow (Russia), May 20, **2021**

5 Rich premixed hydrogen/air oscillatory flames: detailed modelling and model reduction, 7th International Congress on Energy Fluxes and Radiation Effects, Tomsk (Russia), September 14 – 26, **2020**

6 Reduced modelling of chemical kinetics in problems of flame acceleration and DDT, Annual International Symposium of Explosions and Reactive Flows, Beijing Institute of Technology, Beijing (China), September 26-27, **2020**

7 On dimension of a combustion system in the composition state space, International Workshop and School of Young Scientists, Vladivostok (Russia), October 12 – 16, **2020**

8 Role of chemical kinetics in flame acceleration in narrow channels, The 17th International Conference on Numerical Combustion, Aachen (Germany), May 6 – 8, **2019**

9 Reaction-Diffusion Manifolds (REDIMs) for premixed combustion systems – automatic manifold generation procedure, The 7th International Workshop on Model Reduction in Reacting Flows, Trondheim (Norway), June 18 – 21, **2019**

10 Model reduction of mechanisms of chemical kinetics: standard versus recently developed approaches, The 1st International Workshop: Non-linear phenomena and dynamics of flame propagation: theoretical aspects and implementations, Burabay (Kazakhstan), September 21-25, **2019**

11 Model reduction and mechanism comparison of hydrogen/oxygen auto-ignition, 37th International Symposium on Combustion, Dublin (Ireland), 29 July – August 53, **2018**

12 DRG and GQL reduction methods for a H2/Air auto-ignition problem, Joint the German and Italian Meeting of the Combustion Institute, Sorrento (Italy), 23 –26 May, **2018**

13 Modelling of chemical kinetics of combustion processes: mechanisms generation, validation and model Reduction, 14th Int. Conf. on Flow Dynamics, ICFD, Sendai (Japan), 1–3 November 2017, **2017**

14 Hierarchical REDIM based reduced modeling and validation, 26th International Colloquium on the Dynamics of Explosions and Reactive Systems (ICDERS), Boston (US), July 30 – August 3, **2017**

15 Mechanisms of chemical kinetics: detailed modeling and model reduction, Ginzburg Centennial Conference on Physics, Moscow (Russia), 29 May–3 June, **2017**

16 Reduction of detailed reaction mechanism using characteristic time scales, 8th European Combustion Meeting, Dubrovnik (Croatia), April 19–21, **2017**

17 Formation and structure of accelerating combustion wave, 17th International Conference on Numerical Combustion, SIAM, Orlando (USA), April 3–5, **2017**

18 Singularly perturbed vector fields, model reduction of reacting flow systems, 3rd Workshop on Model Reduction of Complex Systems, Odense (Denmark)**,** January 11–13, **2017**

19 Adaptive hierarchical construction of reaction diffusion manifolds for simplified chemical kinetics, 36th International Symposium on Combustion, Seoul (Korea), 31 July–August 5, **2016**

20 Optimal dimension of the combustion mechanism in the ignition problem, 15th International Conference on Numerical Combustion, SIAM, Avignon, France, April 19-22, **2015**

21 On the development of coordinate free model reduction methodology for homogeneous combustion systems, 5th International Workshop on Model Reduction in Reacting Flows (IWMRRF), Spreewald, Germany, June 28–July 1, **2015**

22 REDIM based reduced modeling of transient premixed combustion regimes, 25th International Colloquium on the Dynamics of Explosions and Reactive Systems (ICDERS), Leeds, UK, August 2–7, **2015**

23 Manifold based model reduction strategy - H2/Air mechanism of chemical kinetics, 2nd International Conference on Dynamics and Structure of Combustion Waves, Far Eastern Federal University, Vladivostok, Russia, July 28–August 1, **2014**

24 On structure of fast combustion waves propagating within porous/confined media, 2nd International Conference on Dynamics and Structure of Combustion Waves, Far Eastern Federal University, Vladivostok, Russia, July 28–August 1, **2014**

25 Overview of local and global approaches for model reduction in chemical kinetics, Workshop on Model reduction across disciplines, University of Leicester, UK, 19–22 of August, **2014**

26 Study of extinguishing limits of diluted hydrogen-air counter-flow diffusion flames with the REDIM method, 24th International Colloquium on the Dynamics of Explosions and Reactive Systems (ICDERS), Taipei, (Taiwan), July 28–2 August, **2013**

27 On numerical analysis of hydraulic resistance phenomena in obstructed channels, 14th International Conference on Numerical Combustion, SIAM, San-Antonio, April 8–10, **2013**

28 On Transient Behavior of Non-premixed Counter-flow Diffusion Flames within the REDIM Based Model Reduction Concept, 34th International Symposium on Combustion, Warsaw (Poland), 29 July–August 3, **2012**

29 Manifolds Based Model Reduction for Reacting Flow Systems, Ginzburg Conference on Physics, Moscow (Russia) 28 May–2 Juny, **2012**

30 An Analysis of the Attractive Properties of REDIM Manifolds for Model Reduction, 23rd International Colloquium on the Dynamics of Explosions and Reactive Systems (ICDERS), Irvine (USA), July 24-29, **2011**

31 Thermal Explosion in Sprays, 13th International Conference on Numerical Combustion, Corfu (Greece), April 27-29, **2011**

32 On Investigation of Internal Hierarchy of Chemical Kinetics Mechanisms, 13th International Conference on Numerical Combustion, Corfu (Greece), April 27-29, **2011**

33 Reaction-Diffusion Manifold Based Model Reduction for Reacting Flows, 82nd Annual Meeting of the International Association of Applied Mathematics and Mechanics, Graz (Austria), April 18-21, **2011**

34 On Transformation to the Singularly Perturbed System, Workshop on Multi-Rate Processes and Hysteresis, Pecs (Hungary), 31 May - 3 June, **2010**

35 System Analysis and Model Reduction, The 4th Russian-German Advanced Research Workshop on Computational Science and High Performance Computing, Freiburg (Germany), October 12–16, **2009**

36 Scales Invariant Linear Interpolation and Singular Perturbed Vector Fields, The A4A6 conference, Coping with Complexity: Model Reduction and Data Analysis, Abmleside (UK), 31 August–4 September, **2009**

37 Global Analysis of Chemical Kinetic Mechanisms, 22nd Int. Colloquium on the Dynamics of Explosions and Reactive Systems (ICDERS), Minsk (Belarus), August 27–31, **2009**

38 Model Reduction in Applications, Mathematics in Applications, All-Russian conference in honour of Professor S. K. Godunov's 80th birthday, Novosibirsk (Russia), July 20–24, **2009**

39 Automatic Techniques of Chemical Mechanisms' Analysis, 8th Int. Conference on Mechanisms of Catalytic Reactions, Novosibirsk (Russia), 29 June–2 July, **2009**

40 Global and Comparative Analysis of Chemical Kinetics Models in the Self-ignition Problem, 4th European Comb. Meeting, Vienna (Austria), April 14–17, **2009**

41 Skalierungsinvariante Lineare Interpolation und Singulär Gestörte Vektorfelder, statusseminar IWRMM, Karlsruhe University (Germany), 24 April, **2009**

42 Decomposition of Chemical Kinetics Models in the Auto-ignition Problem, workshop on Mathematics in Chemical Kinetics Engineering, Ghent (Belgium), February 8–11, **2009**

43 Problem Adapted Reduced Models Based on Reaction-Diffusion Manifolds (REDIMs), 32nd International Symposium on Combustion, Montreal (Canada), August 3–8, **2008**

44 Model Reduction of Reacting Flow Systems by Decomposition, Colloquium Thermo- and Fluid dynamic, Institut für Fluiddynamik, ETH Zürich, 21 May, **2008**

45 Dekomposition und Reduktion von Modellen für Selbstzündprozesse, status-seminar IWRMM, Karlsruhe University (Germany), 18 April, **2008**

46 On a Decomposition of Chemical Kinetics Systems in Combustion Problems, Multi-Rate Processes and Hysteresis, Cork (Ireland), 31 Mach–5 April, **2008**

47 Model Redction: Global Approach versus Local one, Seminarvorträge, Institut für Verbrennungstechnik VT, DLR, Stuttgart (Germany), 29 October, **2007**

48 Slow Manifolds of Reaction Convection-Diffusion Systems, Workshop on model reduction in reacting flow, Rome, September 3-5, **2007**

49 On Global Quasi Linearization (GQL) in Model Reduction of Chemical Kinetics, Mathematics of model reduction workshop, Leicester University (UK), August 28-30, **2007**

50 On Averaging Approximations of a Poly-disperse Fuel Spray in Auto-ignition Problem, UK-Israel workshop, Sprays: modeling versus experiments, Brighton University (UK), July 16-18, **2007**

51 Singularly Perturbed Vector Fields and Applications, 6th Negev Applied Mathematical Workshop, Jacob Blaustein Institute for Desert Research, Ben-Gurion University of the Negev (Israel), July 1-5, **2007**

52 Reaction-Diffusion Manifolds in Reacting Flows Modeling, Applied Math. Seminar, Mathematical department, Ben-Gurion University of the Negev (Israel), 5 July, **2007**

53 Dimension Reduction for Large Diffusion Systems, Statusseminar IWRMM, Karlsruhe University (Germany), 20 April, **2007**

54 Global Quasi Linearization (GQL) for the Automatic Reduction of Chemical Kinetics, 3rd European Combustion meeting (ECM), Chania, (Greece), April 11-13, **2007**

55 Extension of the ILDM Method to the Domain of Slow Chemistry, 31st International Symposium on Combustion, Heidelberg (Germany), August 6-11, **2006**

56 ILDM Based Model Reduction for Reaction-Diffusion-Convection Systems, 11th International Conference on Numerical Combustion (NC), Granada, (Spain), April 23-26, **2006**

57 Application of Reduction Methods Based on Decomposition for Modelling of Reacting Flows, Applied Math. Seminar, Ben-Gurion University of the Negev (Israel), 24 November, **2005**

58 Generation of Reduced Models by Decoupling of Chemical Kinetics and Convection/Diffusion Processes, 20th International Colloquium on the Dynamics of Explosions and Reactive Systems (ICDERS), Montreal (Canada), July 31-August 5, **2005**

59 Mathematical Problems of Multiphase Combustion, Mini-Conference, Brighton University, Brighton (England), 30 August, **2004**

60 Flammability Limits in Narrow Channels, Australasian Workshop on Mathematics in Combustion (AWOMIC), Queensland (Australia), **2003**

61 Effects of Inertia and Momentum Losses on Subsonic Pressure Driven Flames in Porous Media, 5th International Congress on Industrial and Applied Mathematics (ICIAM), Sydney (Australia), **2003**

62 On Pressure Driven Flames in Porous Medium, 29th International Symposium on Combustion, Hokkaido University, Sapporo (Japan), **2002**

63 Inertia Effect on a Structure of “Baro-diffusion” Flame in Porous Medium, 18th Annual Symposium on of the Israeli Section of the Combustion Institute, Jerusalem (Israel), 2002

64 Thermal Explosion in a Droplet-Gas Cloud with Chemical Reaction of General Order, 18th International Colloquium on the Dynamics of Explosions and Reactive Systems (ICDERS), Seattle (USA), **2001**

65 On a Flame in Porous Media Driven by Pressure Diffusion, 17th Annual Symposium of the Israel Section of the Combustion Institute, Technion (Israel), **2001**

66 The Effect of Mixture Stoichiometry on Thermal Explosion in a Hot Gas Mixture with Fuel Droplets, 16th Annual Symposium of the Israel Section of the Combustion Institute, Tel-Aviv (Israel), **2000**

67 Oxidizer Effect on Thermal Explosion in Hot Gas Mixture with Fuel Droplets, 15th Annual Symposium of the Israeli Section of Combustion Institute, Beer-Sheva (Israel), **1999**