

List of publications and presentations

V Bykov

March, 2025

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. Moroshkina A., Yakupov E., Mislavskii V., Sereshchenko E., Polezhaev A., Minaev S., Gubernov V., Bykov V., The performance of reaction mechanism in prediction of the characteristics of the diffusive-thermal oscillatory instability of methane–hydrogen–air burner-stabilized flames, (**2024**), 215, pp. 496 – 504.
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7. Volkov D., Moroshkina A., Mislavskii V., Sereshchenko E., Gubernov V., Bykov V., Minaev S., Relaxational oscillations of burner-stabilized premixed methane–air flames, (**2024**), 259, art. no. 113141.
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8. Moroshkina A., Ponomareva A., Mislavskii V., Sereshchenko E., Gubernov V., Bykov V., Minaev S., Activation Energy of Hydrogen–Methane Mixtures, (**2024**), 7 (2), art. no. 42.
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9. Shrotriya P., Schießl R., Yu C., Bykov V., Zirwes T., Maas U., An iterative methodology for REDIM reduced chemistry generation and its validation for partially-premixed combustion, (**2024**), 28 (1), pp. 65 – 98.
DOI: 10.1080/13647830.2023.2260350
10. Moroshkina, A., Mislavskii, V., Kichatov, B., Gubernov, V., Bykov, V., Maas, U. Burner stabilized flames: Towards reliable experiments and modelling of transient combustion (**2023**) Fuel, 332, art. no. 125754.
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11. Yu C., Bykov V. GQL-RedChem: A MatLAB-based tool for the model reduction for chemical kinetics based on the Global Quasi-linearization (GQL) approach (2023) *Software Impacts*, 17, art. no. 100555.
DOI: 10.1016/j.simpa.2023.100555
12. Kiverin A., Medvedkov I., Yakovenko I., Bykov V. Three-dimensional structure of freely-propagating flame prior to deflagration-to-detonation transition (2023) *Acta Astronautica*, 204, pp. 686 – 691.
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13. Shrotriya P., Schießl R., Yu C., Bykov V., Zirwes T., Maas U. An iterative methodology for REDIM reduced chemistry generation and its validation for partially-premixed combustion (2023) *Combustion Theory and Modelling*, in press.
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14. Moroshkina A.D., Ponomareva A.A., Mislavskii V.V., Sereshchenko E.V., Gubernov V.V., Bykov V.V., Minaev S.S. Determining the global activation energy of methane–air premixed flames (2023) *Combustion Theory and Modelling*, 27 (7), pp. 909 - 924.
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17. 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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20. 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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Presentations of published papers at conferences/meetings

- 1 Tabulation chemistry: applications, implementation problems and perspectives, 3rd International Workshop: Non-linear phenomena and dynamics of flame propagation: theoretical aspects and implementations, Burabay (Kazakhstan) 22-26 September **2024**, Burabay, Kazakhstan
- 2 Unsteady counter-diffusion flames: regimes multiplicity and perspectives for validation of kinetic mechanisms of chemical reactions, XV International Symposium "Combustion and Plasmochemistry. Physics and Chemistry of Carbon and Nano energy Materials", October 1-3, **2024**, Almaty, Kazakhstan
- 3 Theory of Singularly Perturbed Vector Fields - Application to Model Reduction, International Conference on Mathematical Sciences & Computer Engineering, 17-19 May **2023**, Osaka, Japan
- 4 Urea-water-solution (UWS) evaporation and decomposition for selective catalytic reduction of NO_x, XIV International Symposium "Combustion and Plasmochemistry. Physics and Chemistry of Carbon and Nano energy Materials", November 7-9, **2023**, Almaty, Kazakhstan
- 5 Problem oriented model reduction of mechanisms of chemical kinetics: theory and applications, 2nd International Workshop: Non-linear phenomena and dynamics of flame propagation: theoretical aspects and implementations, Burabay (Kazakhstan), September 24-29, **2022**

- 6 Study of mechanism of ammonia decomposition and oxidation: From NO_x reduction to ammonia auto-ignition problem, 39th International Symposium on Combustion, Vancouver (Canada), July 24-29, **2022**
- 7 Improvement of the Global Quasi-Linearisation (GQL) Model Reduction Method, 28th International Colloquium on the Dynamics of Explosions and Reactive Systems (ICDERS), Naples (Italy), June 20-24, **2022**
- 8 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**
- 9 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**
- 10 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**
- 11 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**
- 12 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**
- 13 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**
- 14 On dimension of a combustion system in the composition state space, International Workshop and School of Young Scientists, Vladivostok (Russia), October 12 – 16, **2020**
- 15 Role of chemical kinetics in flame acceleration in narrow channels, The 17th International Conference on Numerical Combustion, Aachen (Germany), May 6 – 8, **2019**
- 16 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**
- 17 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**
- 18 Model reduction and mechanism comparison of hydrogen/oxygen auto-ignition, 37th International Symposium on Combustion, Dublin (Ireland), 29 July – August 5, **2018**
- 19 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**
- 20 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**
- 21 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**
- 22 Mechanisms of chemical kinetics: detailed modeling and model reduction, Ginzburg Centennial Conference on Physics, Moscow (Russia), 29 May–3 June, **2017**
- 23 Reduction of detailed reaction mechanism using characteristic time scales, 8th European Combustion Meeting, Dubrovnik (Croatia), April 19–21, **2017**
- 24 Formation and structure of accelerating combustion wave, 17th International Conference on Numerical Combustion, SIAM, Orlando (USA), April 3–5, **2017**
- 25 Singularly perturbed vector fields, model reduction of reacting flow systems, 3rd Workshop on Model Reduction of Complex Systems, Odense (Denmark), January 11–13, **2017**
- 26 Adaptive hierarchical construction of reaction diffusion manifolds for simplified chemical kinetics, 36th International Symposium on Combustion, Seoul (Korea), 31 July–August 5, **2016**
- 27 Optimal dimension of the combustion mechanism in the ignition problem, 15th International Conference on Numerical Combustion, SIAM, Avignon, France, April 19-22, **2015**
- 28 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**

- 29 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**
- 30 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**
- 31 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**
- 32 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**
- 33 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**
- 34 On numerical analysis of hydraulic resistance phenomena in obstructed channels, 14th International Conference on Numerical Combustion, SIAM, San-Antonio, April 8–10, **2013**
- 35 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**
- 36 Manifolds Based Model Reduction for Reacting Flow Systems, Ginzburg Conference on Physics, Moscow (Russia) 28 May–2 Juny, **2012**
- 37 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**
- 38 Thermal Explosion in Sprays, 13th International Conference on Numerical Combustion, Corfu (Greece), April 27–29, **2011**
- 39 On Investigation of Internal Hierarchy of Chemical Kinetics Mechanisms, 13th International Conference on Numerical Combustion, Corfu (Greece), April 27–29, **2011**
- 40 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**
- 41 On Transformation to the Singularly Perturbed System, Workshop on Multi-Rate Processes and Hysteresis, Pecs (Hungary), 31 May - 3 June, **2010**
- 42 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**
- 43 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**
- 44 Global Analysis of Chemical Kinetic Mechanisms, 22nd Int. Colloquium on the Dynamics of Explosions and Reactive Systems (ICDERS), Minsk (Belarus), August 27–31, **2009**
- 45 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**
- 46 Automatic Techniques of Chemical Mechanisms' Analysis, 8th Int. Conference on Mechanisms of Catalytic Reactions, Novosibirsk (Russia), 29 June–2 July, **2009**
- 47 Global and Comparative Analysis of Chemical Kinetics Models in the Self-ignition Problem, 4th European Comb. Meeting, Vienna (Austria), April 14–17, **2009**
- 48 Skalierungsinvariante Lineare Interpolation und Singulär Gestörte Vektorfelder, statusseminar IWRMM, Karlsruhe University (Germany), 24 April, **2009**
- 49 Decomposition of Chemical Kinetics Models in the Auto-ignition Problem, workshop on Mathematics in Chemical Kinetics Engineering, Ghent (Belgium), February 8–11, **2009**
- 50 Problem Adapted Reduced Models Based on Reaction-Diffusion Manifolds (REDIMs), 32nd International Symposium on Combustion, Montreal (Canada), August 3–8, **2008**
- 51 Model Reduction of Reacting Flow Systems by Decomposition, Colloquium Thermo- and Fluid dynamic, Institut für Fluidodynamik, ETH Zürich, 21 May, **2008**
- 52 Dekomposition und Reduktion von Modellen für Selbstzündprozesse, status-seminar IWRMM, Karlsruhe University (Germany), 18 April, **2008**

- 53 On a Decomposition of Chemical Kinetics Systems in Combustion Problems, Multi-Rate Processes and Hysteresis, Cork (Ireland), 31 March–5 April, **2008**
- 54 Model Reduction: Global Approach versus Local one, Seminarvorträge, Institut für Verbrennungstechnik VT, DLR, Stuttgart (Germany), 29 October, **2007**
- 55 Slow Manifolds of Reaction Convection-Diffusion Systems, Workshop on model reduction in reacting flow, Rome, September 3-5, **2007**
- 56 On Global Quasi Linearization (GQL) in Model Reduction of Chemical Kinetics, Mathematics of model reduction workshop, Leicester University (UK), August 28-30, **2007**
- 57 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**
- 58 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**
- 59 Reaction-Diffusion Manifolds in Reacting Flows Modeling, Applied Math. Seminar, Mathematical department, Ben-Gurion University of the Negev (Israel), 5 July, **2007**
- 60 Dimension Reduction for Large Diffusion Systems, Statusseminar IWRMM, Karlsruhe University (Germany), 20 April, **2007**
- 61 Global Quasi Linearization (GQL) for the Automatic Reduction of Chemical Kinetics, 3rd European Combustion meeting (ECM), Chania, (Greece), April 11-13, **2007**
- 62 Extension of the ILDM Method to the Domain of Slow Chemistry, 31st International Symposium on Combustion, Heidelberg (Germany), August 6-11, **2006**
- 63 ILDM Based Model Reduction for Reaction-Diffusion-Convection Systems, 11th International Conference on Numerical Combustion (NC), Granada, (Spain), April 23-26, **2006**
- 64 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**
- 65 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**
- 66 Mathematical Problems of Multiphase Combustion, Mini-Conference, Brighton University, Brighton (England), 30 August, **2004**
- 67 Flammability Limits in Narrow Channels, Australasian Workshop on Mathematics in Combustion (AWOMIC), Queensland (Australia), **2003**
- 68 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**
- 69 On Pressure Driven Flames in Porous Medium, 29th International Symposium on Combustion, Hokkaido University, Sapporo (Japan), **2002**
- 70 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
- 71 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**
- 72 On a Flame in Porous Media Driven by Pressure Diffusion, 17th Annual Symposium of the Israel Section of the Combustion Institute, Technion (Israel), **2001**
- 73 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**
- 74 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**