The Curriculum Vitae

David Stanovský

General Information

Personal Data

born	September 30, 1977
nationality	Czech
citizenship	Czech Republic
marital status	married, twin sons and daughter
languages	Czech (native), English, Russian (fluently)

Education

1995–2004 Charles University in Prague, Czech Republic

2001	Master's degree in Mathematics, advisor Tomáš Kepka
2003	a degree in Mathematics Education
2004	PhD in Mathematics, advisor Jaroslav Ježek

Long term visits during my studies:

1999 (4 months)	Vrije Universiteit, Amsterdam, Netherlands (Erasmus program)
2003 (2 months)	Vanderbilt University, Nashville, TN (visiting Ralph McKenzie)
2004 (2 months)	Vanderbilt University, Nashville, TN (visiting Ralph McKenzie)

Jobs

2005–2012	assistant professor, Charles University in Prague, Czech Republic.
from 2013	associate professor ("docent"), Charles University in Prague.

Long term visits after graduation:

2004 (2 months)	Vanderbilt University, Nashville, TN
2007 (5 months)	Novosibirsk State Technical University, Russia
2011/12 (1 year)	University of Denver, USA

Habilitation in algebra in 2012.

Research

My primary research interest is general algebra. A major part of my work relates to universal algebra and non-associative algebraic structures, such as quasigroups, loops, and selfdistributive structures. My secondary interest is automated theorem proving in service of solving mathematical problems.

Summary

- 23 papers in mathematical journals (13 indexed by WoS), 3 submitted
- 3 papers in artificial intelligence (1 journal, 1 LNAI, 1 workshop proceedings)

- about 25 lectures at conferences, 15 lectures at seminars of foreign institutions
- extensive participation on grant projects, principal investigator of a postdoctoral project by the Czech Grant Agency
- organizing several international mathematical conferences and scientific schools for students

Teaching

I have an extensive teaching experience, from teaching assistant service during my studies, to the associate professor position I hold since 2013. I have valuable experiences from teaching in the United States (University of Denver) and in Russia (Novosibirsk State Technical University).

Summary

- 1998-2004 teaching assistant at Charles University, Prague
- since 2005 regular position at Charles University, Prague
- 2007 lecturing at Novosibirsk State Technical University, Russia
- 2011/12 lecturing at University of Denver, USA
- author of two texbooks, *Fundamentals of abstract algebra*, and *Computer algebra* (with L. Barto), published by Matfyzpress, the university publishing house
- extensive advising of bachelors and masters students of math and computer science, two theses were awarded a prize (M. Scholle, the best thesis in 2010; J. Vlachý, first prize at the Czech-Slovak mathematics competition)
- cofounder of the Seminar on combinatorial, algorithmic and finitary algebra (since 2005)
- initiated a series of spring and fall schools for the students of our department

Professional Service

- organizing scientific events
  - technical support (Spring Schools in Analysis, EVEQ 2000, Loops'03)
  - principal organizer of Loops'07 (Prague) and Loops'11 (Třešť)
  - organizing triumvirate for the Summer School on Algebras and Ordered Sets (Třešť 2008), and the International Conference on Algebras and Lattices (Prague 2010)
  - program committee of ESARM (Birmingham 2008) a AutoMaTheo (Edinburgh 2010) workshops in artificial intelligence
- organizing mathematical events for students
  - a high school competition (1995-1999)
  - spring and fall schools for students of our department (since 2010)
- elected in the academic senate several times, discontinuous membership since 1999
  - 2000/01 chair of the student chamber
  - 2011/12 and 2013/14 vicechair of the senate
- vicechair of the Department of Algebra (since 2010)

Data

List of Publications

[1] D. Stanovský, *Homomorphic images of subdirectly irreducible groupoids*, Comment. Math. Univ. Carolinae 42/3 (2001) 443–450.
An algebra A is a homomorphic image of a subdirectly irreducible algebra (over its monolith) if and only if A has non-empty intersection of its ideals.

[2] D. Stanovský, *On equational theory of group conjugation*, Contributions to General Algebra 15 (2004), Proceedings of Klagenfurt Workshop AAA66, 175–181.
Given a group, there is a natural operation of conjugation, defined by $x*y = xyx^{-1}$. We study the variety generated by all $G(*)$, G a group. In particular, we are concerned about the question, whether this variety is finitely based.

[3] D. Stanovský, *On varieties of left distributive left idempotent groupoids*, Discussiones Math. — General Algebra and Appl. 24/2 (2004) 267–275.
We describe a part of the lattice of subvarieties of left distributive left idempotent groupoids (i.e. those satisfying the identities $x(yz) \approx (xy)(xz)$ and $(xx)y \approx xy$) modulo the lattice of subvarieties of left distributive idempotent groupoids. A free groupoid in a subvariety of LDLI groupoids satisfying an identity $x^n \approx x$ decomposes as the direct product of its largest idempotent factor and a cycle. Some properties of subdirectly ireducible LDLI groupoids are found.

[4] E. Jeřábek, T. Kepka, D. Stanovský, *Non-idempotent left symmetric left distributive groupoids*, Discussiones Math. — General Algebra and Appl. 25/2 (2005) 235–257.
We study non-idempotent left symmetric left distributive groupoids. Particularly, we focus our attention at subdirectly irreducible ones.

[5] D. Stanovský, *Left symmetric left distributive operations on groups*, Algebra Universalis 54/1 (2005), 97–103.
We study equational theories of several left symmetric left distributive operations on groups. Normal forms of terms in the variety of LSLD groupoids, LSLD medial groupoids, LSLD idempotent groupoids and LSLD medial idempotent groupoids are found.

[6] R. McKenzie, D. Stanovský, *Every quasigroup is isomorphic to a subdirectly irreducible quasigroup modulo its monolith*, Acta Sci. Math. (Szeged) 72 (2006), 59–64.
Every quasigroup (loop, group, resp.) is isomorphic to a subdirectly irreducible quasigroup (loop, group, resp.) modulo its monolith. A generalized wreath product is used in the construction.

[7] D. Stanovský, *On axioms of biquandles*, J. Knot Th. Ramifications 15/7 (2006) 931–933.
We prove that the two conditions from the definition of a biquandle by Fenn, Jordan-Santana, Kauffman are equivalent and thus answer a question posed in their paper. We also construct a weak biquandle, which is not a biquandle.

[8] P. Đapić, J. Ježek, P. Marković, R. McKenzie, D. Stanovský, $*$-*linear equational theories of groupoids*, Algebra Universalis 56/3-4 (2007), 357–397.
We investigate equational theories E of groupoids with the property that every term is E-equivalent to a unique linear term.

[9] D. Stanovský, *Commutative idempotent residuated lattices*, Czech. Math. J. 57/1 (2007), 191–200.
We investigate the variety of residuated lattices with a commutative and idempotent monoid reduct. Among others, we prove that it does not satisfy any non-trivial lattice equation, describe CI residuated chains, find a non-finitely based subvariety and characterize minimal subvarieties of this variety.

[10] J. Ježek, P. Marković, D. Stanovský, *Homomorphic images of finite subdirectly irreducible unary algebras*, Czech Math. J. 57/2 (2007), 671–677.
We prove that a finite unary algebra with at least two operation symbols is a homomorphic image of a (finite) subdirectly irreducible algebra if and only if the intersection of all its subalgebras which have at least two elements is nonempty.

[11] D. Stanovský, *Subdirectly irreducible left distributive left quasigroups*, Commun. Algebra, 36/7 (2008), 2654–2669.
Left distributive left quasigroups are binary algebras with unique left division satisfying the left distributive identity $x(yz) \approx (xy)(xz)$. In other words, binary algebras where all left translations are automorphisms. We provide a description and examples of non-idempotent subdirectly irreducible algebras in this class.

[12] D. Stanovský, *Distributive groupoids are symmetric-by-medial: An elementary proof*, Comment. Math. Univ. Carolinae 49/4 (2008), 541–546.
We present an elementary proof (purely in equational logic) that distributive groupoids are symmetric-by-medial.

[13] K. Adaricheva, A. Pilitowska, D. Stanovský, *On complex algebras of subalgebras*, Algebra i logika 47/6 (2008), 655–686 (Russian). Translation *On complex algebras of subalgebras*, Algebra and logic 47/6 (2008), 367–383.
Let $\mathcal{V}$ be a variety of algebras. We establish a condition (so called *complex condition*), equivalent to the fact that for every algebra $A \in \mathcal{V}$, the set of all subalgebras of A is a subuniverse of the complex algebra of subsets $\mathrm{P}A$. We investigate the relationship between the complex condition and the entropic law. Further, provided the complex condition is satisfied in $\mathcal{V}$, we study the identities satisfied by the complex algebras of subalgebras of algebras from $\mathcal{V}$.

[14] JD Phillips, D. Stanovský, *Automated theorem proving in loop theory*, proceedings of the ESARM workshop, Birmingham, 2008.
In this paper we compare the performance of various automated theorem provers on nearly all of the theorems in loop theory known to have been obtained with the assistance of automated theorem provers. Our analysis yields some surprising results, e.g., the theorem prover most often used by loop theorists doesn't necessarily yield the best performance.

[15] A. Kravchenko, A. Pilitowska, A. Romanowska, D. Stanovský, *Differential modes*, Internat. J. Algebra Comput. 18/3 (2008), 567–588.
Modes are idempotent and entropic algebras. Although it had been established many years ago that groupoid modes embed as subreducts of semimodules over commutative semirings, the general embeddability question remained open until recent constructions of isolated examples of modes without such an embedding. The current paper now presents a broad class of modes that are not embeddable into semimodules, including structural investigations and an analysis of the lattice of varieties.

[16] A. Pilitowska, A. Romanowska, D. Stanovský, *Varieties of differential modes embeddable into semimodules*, Internat. J. Algebra Comput. 19/5 (2009), 669–680.
We study so called Szendrei differential modes, the variety of differential modes that embed into semimodules. The main result states that the lattice of non-trivial subvarieties is dually isomorphic to the (non-modular) lattice of congruences of the free commutative monoid on two generators. Consequently, all varieties of Szendrei differential modes are finitely based.

[17] D. Stanovský, *Idempotent subreducts of semimodules over commutative semirings*, Rend. Semin. Mat. Univ. Padova 121 (2009), 33–43.
A short proof of the characterization of idempotent subreducts of semimodules over commutative semirings is presented. It says that an idempotent algebra embeds into a semimodule over a commutative semiring, if and only if it belongs to the variety of Szendrei modes.

[18] JD Phillips, D. Stanovský, *Automated theorem proving in quasigroup and loop theory*, Artificial Intelligence Communications 23/2-3 (2010), 267–283.
We survey all known results in the area of quasigroup and loop theory to have been obtained with the assistance of automated theorem provers. We provide both informal and formal descriptions of selected problems, and compare the performance of selected state-of-the art first order theorem provers on them. Our analysis yields some surprising results, e.g., the theorem prover most often used by loop theorists does not necessarily yield the best performance.

[19] M. Stronkowski, D. Stanovský, *Embedding general algebras into modules*, Proc. Amer. Math. Soc. 138/8 (2010), 2687–2699.
The problem of embedding general algebras into modules is revisited. We provide a new method of embedding, based on Ježeks embedding into semimodules. We obtain several interesting consequences: a simpler syntactic characterization of quasi-affine algebras, a proof that quasi-affine algebras without nullary operations are actually quasi-linear, and several facts regarding the "abelian iff quasi-affine" problem.

[20] L. Barto, D. Stanovský, *Polymorphisms of small digraphs*, Novi Sad J. Math. 40/2 (2010), 95–109.
For each digraph with at most 5 vertices, we provide a list of its polymorphisms interesting with respect to the complexity of the corresponding Constraint Satisfaction Problem. We find a digraph on six vertices such that the complexity of its retraction problem is unknown with current techniques; this is the smallest such example.

[21] J. Vyskočil, D. Stanovský, J. Urban, *Automated proof compression by invention of new definitions*, LPAR-16 (Dakar, 2010), in LNAI 6355.
We propose a new algorithm for automated compression of arbitrary sets of terms (like mathematical proofs) by invention of new definitions, using a heuristics based on substitution trees. The algorithm has been implemented and tested on a number of automatically found proofs.

[22] D. Stanovský, *Selfdistributive groupoids. A2. Non-idempotent left distributive left quasigroups*, Acta Univ. Carolinae Math. Phys. 52/2 (2011), 7–28.
A comprehensive survey of non-indempotent left distributive left quasigroups. It contains several new results about free groupoids and normal forms of terms in

certain subvarieties.

[23] JD Phillips, D. Stanovský, *Bruck loops with abelian inner mapping groups*, Commun. Alg. 40/7 (2012), 2449–2454.
Bruck loops with abelian inner mapping groups are centrally nilpotent of class at most 2.

[24] D. Stanovský, *Subdirectly irreducible differential modes*, Internat. J. Algebra Comput. 22/4 (2012), 1250028 (18p.).
We show an explicit description of subdirectly irreducible algebras in this variety, and use it to compute residual bounds of its subvarieties. It follows from our results that all subvarieties with a finite residual bound are finitely based.

[25] D. Stanovský, *Abelian differential modes are quasi-affine*, Coment. Math. Univ. Carolinae 53/3 (2012), 461–473.
We characterize abelian algebras in the class of differential modes and prove that all of them are quasi-affine, i.e., they are subreducts of modules over commutative rings.

[26] D. Stanovský, P. Vojtěchovský, *Commutator theory for loops*, to appear in J. Algebra.
Using the Freese-McKenzie commutator theory for congruence modular varieties as the starting point, we develop commutator theory for the variety of loops. The fundamental theorem of congruence commutators for loops relates generators of the congruence commutator to generators of the total inner mapping group. We specialize the fundamental theorem into several varieties of loops, and also discuss the commutator of two normal subloops. Consequently, we argue that some standard definitions of loop theory, such as elementwise commutators and associators, should be revised and linked more closely to inner mappings.

Grant Participation

I participated in the following grant projects:

2000	FRVŠ 1920/2000	*Methodical aspects of binary systems* (student project)
2002	FRVŠ 2416/2002	*Varieties of universal algebras* (student project)
2002–04	GAČR 201/02/0594	*Varieties of algebras*
2002–04	GAČR 201/02/0148	*Categorical methods in informatics and structural mathematics*
2005–07	GAČR 201/05/0002	*Structure of algebras in varieties*
2006–07	INTAS	*Universal algebra and lattice theory* (international cooperation project)
2008–10	GAČR 201/08/P056	*Algorithmic and structural problems of equational logic* (principal investigator)
2013–17	GAČR 13-01832S	*General algebra and its connections to computer science*
2013–14	MŠMT 7AMB13P1013	*General algebra and applications* (international cooperation project, p.i.)

List of Courses — exercise sessions

1998/99 fall	General Algebra
1999/00 spring	Linear Algebra
2000/01 fall	Linear Algebra
2000/01 spring	Linear Algebra
2001/02 fall	Linear Algebra
2001/02 spring	General Algebra
2002/03 fall	Linear Algebra
2003/04 spring	General Algebra
2004/05 spring	Linear Algebra
2006/07 spring	General Algebra, Discrete Mathematics (at NSTU, Russia)
2007/08 spring	General Algebra
2008/09 spring	Proseminar on Number Theory
2009/10 spring	Computer Algebra
2010/11 spring	Computer Algebra

List of Courses — lectures

2004/05 spring	Computer Algebra
2005/06 fall	General Algebra
2005/06 spring	Computer Algebra
2006/07 fall	General Algebra
2007/08 fall	General Algebra
2007/08 spring	Computer Algebra
2008/09 fall	General Algebra
2008/09 spring	Computer Algebra
2008/09 spring	Computer Algebra II
2009/10 fall	General Algebra
2009/10 fall	Automated Theorem Proving
2009/10 spring	Computer Algebra II
2009/10 spring	Finite Fields
2010/11 fall	General Algebra
2010/11 fall	Automated Theorem Proving
2010/11 fall	Group Theory
2010/11 spring	General Algebra
2011/12 year round	Calculus I,II,III (at University of Denver, USA)
2011/12 fall	Calculus for Bussiness and Social Sciences (at Denver)
2012/13 year round	General Algebra
2013/14 fall	General Algebra
2013/14 fall	Commutative Algebra