

Curriculum vitae

February 1, 2014

Family name: Kolman

First name: Radek

Title: Ing., Ph.D.

Date of birth: October 14, 1977

Nationality: Czech

Marital status: married

Children: three (10, 6 and 4 years old)

Affiliation: Institute of Thermomechanics, (IT ASCR)
Academy of Sciences of the Czech Republic, v.v.i.
Department D4 - Impact and Waves in Solids
Laboratory of Computational Solid Mechanics
Dolejšková 1402/5
182 00 Prague 8
Czech Republic

Position: research scientist
head of the Laboratory of Computational Solid Mechanics
<http://www.it.cas.cz/en/d4/l041>

**Personal:
address** U Rendlíku 1906
393 01 Pelhřimov
Czech Republic

Contacts: mobil ph.: +420 720 101 837
telephone: +420 266 053 214
e-mail: kolman@it.cas.cz
homepage: <http://www.it.cas.cz/cs/kolmanr>

Education: 1992 - 1996 Secondary Technical School, Pelhřimov
Study program: Mechanical Engineering

1996 - 2002 **M.Sc. degree** at Faculty of Mechanical Engineering (FME),
Czech Technical University in Prague (CTU Prague)
Study program: Applied Mechanics
Title of Ms. thesis: Simulation of sheet metal forming process
and verification of PAM-STAMPTM Software

2002 - 2009 **PhD. degree** at Department of Mechanics, Biomechanics
and Mechatronics, Faculty of Mechanical Engineering (FME), Czech
Technical University in Prague (CTU Prague)
Study program: Mechanics of solids, deformable bodies and continua

Title of PhD. thesis: Dispersion properties of plane square serendipity finite element in elastodynamics

Career/employment: 7/2001 - study stay at the Škoda Auto (one month)
1/2003 - 10/2009 - IT ASCR (part-time, PhD. student position)
9/2004 - 8/2005 - Agrostroj Pelhřimov s.r.o. (part-time, designer, structural engineering, sheet metal forming specialist)
9/2005 - 10/2009 - Agrostroj Pelhřimov s.r.o. (full-time, designer, structural engineering, sheet metal forming specialist)
11/2009 - 12/2011 - IT ASCR (full-time, post-doctoral position)
since 1/2012 - IT ASCR (full-time, research scientist position)

Teaching: FME CTU courses:
2002 - 2004 Strength of Materials I, II
2001 - 2003 Plasticity and creep (part Plasticity)

Scientific internships: 10/2012 - 12/2012 - Ocean System Engineering (OSE), Korea Advanced Institute of Science and Technology (KAIST), Daejeon, Korea
7/2013 - 8/2013 - OSE, KAIST, Daejeon, Korea
10/2013 - 11/2013 - OSE, KAIST, Daejeon, Korea

Awards: 2011 - the 2-nd place in the Prize of Prof. Ivo Babuška (awarded by the Czech Society for Mechanics and by the Czech Society for Mathematics and Physics) for the doctoral thesis

Research activities: continuum mechanics, finite element method, wave propagation, dispersion, dynamics, vibration, isogeometric analysis

Publications: see the list of publications

H-index (WoS): 2

WoS citations: 14

Scopus citations: 17

WoS items: 5

Scopus items: 10

Professional competences: Consultant of 1 Master student
(title 'On the Mass Lumping in the Finite Element Method')
Consultant of 1 Ph.D. student

Chairman of conference organizing committee: Spliny and IsoGeometric Analysis **SIGA 2011**, IT ASCR, Prague, CR
Spliny and IsoGeometric Analysis **SIGA 2012**, IT ASCR, Prague, CR
EUROMECH Colloquium 540 - Advanced Modelling of Wave Propagation in Solids, IT AS CR, Prague, CR, October 1-3, 2012

Chairman of conference nini-symposiums: ECNDT 2014, Prague, MS on Wave propagation in solids and structures
COMPDYN 2015, Crete, MS on Non-linear dynamics and wave propagation

Reviewer of journals: Journal of Mechanical Engineering Science
Engineering Mechanics

Memberships: Central European Association for Computational Mechanics (CEACM)
Czech Society for Mechanics

Research projects : IAA2076904: Diagnostics of transient dynamic responses in plate and shell structures, AV0/IA, 1999-2003, member of team.
GACR 101/07/0588: Nondestructive analyses of defects in thin wall shells using acoustical wave propagation, GACR, 2007-2009, member of team.
GACR 101/07/1471: Finite element modelling of linear, non-linear and multi-scale effects in wave propagation in solids and heterogeneous media, GACR, 2007-2011, member of team.
ME10114: Numerical solution of impact/contact problems in non-linear finite element analysis, MSM/ME, 2010-2012, member of team.
GACR 101/09/1630: Numerical solution to steady-state and transient wave dispersion in mechanical systems on different scales, GACR, 2009-2013, member of team.
GAP101/11/0288: Design of intelligent composite structures, GACR, 2011-2014, member of team.
GAP101/12/2315: Modelling of acoustic wave propagation in strongly heterogeneous media; multi-scale numerical and analytical approaches, GACR, 2012-2016, member of team.
GPP101/10/P376: Study of dispersion properties of finite element method in elastic wave propagation problems, GACR, 2010-2012, post-doctorant project, applicant.

Languages: English - advanced
German - beginner

Relevant skills: programming (Fortran, C++, Pascal)
FEM systems - ANSYS, MARC/MENTAT, PAM-STAMP, PMD
FE implementation - Tahoe (in C++), PMD (in Fortran 77)
CAD systems - Catia V.5 R.14, VisiCad V.13
other programmes: Matlab, Maple
clean driving licence

Interests: travelling, history, mathematics, physics

List of publications

Book chapters

J. Plešek, R. Kolman, D. Gabriel. Dispersion Error of Finite Element Discretizations in Elastodynamics. Eds. B.H.V Topping, J.M. Adam, F.J. Pallarés, R.Bru, M.L. Romero. *Computational Technology Reviews*, Volume **1**, pp.251-279, 2010.

Journal papers

R. Kolman, J. Plešek, M. Okrouhlík. Complex wavenumber Fourier analysis of the B-spline based finite element method, *Wave Motion*, 2014, <http://dx.doi.org/10.1016/j.wavemoti.2013.09.003>. (IF=1.467)

R. Kolman, J. Plešek, M. Okrouhlík, D. Gabriel. Grid dispersion analysis of plane square biquadratic serendipity finite elements in transient elastodynamics. *International Journal for Numerical Methods in Engineering* **96**(1), pp. 1–28, 2013. (IF=2.056)

R. Kolman. Isogeometric free vibration of elastic block. *Engineering mechanics* **19**(4), pp. 279–291, 2012.

D. Gabriel, J. Plešek, R. Kolman, F. Valeš. Dispersion of elastic waves in the contact-impact problem of a long cylinder. *Journal of computational and Applied Mathematics*, **234**(6), pp. 1930–1936, 2010. (IF=1.030)

J. Trnka, R. Kolman, P. Dvořáková, E. Veselý. A Study of Stress Wave Propagation in Thin Plate Loaded by an Oblique Impact. *International Review of Mechanical Engineering*, **3**(3), pp. 322-331, 2009.

R. Kolman, J. Plešek, D. Gabriel, M. Okrouhlík. Optimization of lumping schemes for plane square quadratic finite element in elastodynamics. *Applied and Computational Mechanics*, **1**(1), pp. 105-114, 2007.

R. Kolman, J. Plešek, M. Landa. Finite Element Computational Technology for Composite Materials, *Materials Science Forum*, **482**, pp. 343-346, 2005. (IF=0.399)

J. Plešek, R. Kolman, M. Landa. Using Finite Element Method for the Determination of Elastic Moduli by Resonant Ultrasound Spectroscopy. *Journal of the Acoustical Society of America*, **116**(1), pp. 282-287, 2004. (IF=1.398)

R. Kolman, J. Trnka, J. Plešek. Numerical-experimental analysis of stress waves propagation in a steel plate under perpendicular impact loadings, *Engineering Mechanics*, **11**(6), pp. 1-13, 2004.

Conference papers and contributions

R. Kolman, S.S. Cho, K.C. Park. Nearly non-spurious oscillations time scheme in finite element analysis of non-linear wave propagation and dynamic fracture mechanics. In the Third International Conference on Computational Modeling of Fracture and Failure of Materials and Structures (CFRAC 2013), Prague, Czech Republic, June 5-7, 2013.

R. Kolman, S.S. Cho, K.C. Park. Non-spurious oscillations time integration method in finite element analysis of non-linear wave propagation of stress Discontinuities. In the 4th ECCOMAS Thematic Conference on Computational Methods in Structural Dynamics and Earthquake Engineering COMPDYN 2013, Kos, Greece, June 12-14, 2013.

R. Kolman, J. Plešek, M. Okrouhlík, D. Gabriel, J. Kopačka. Verification of isogeometric analysis in elastic wave propagation of stress discontinuities. In the 4th ECCOMAS Thematic Conference on Computational Methods in Structural Dynamics and Earthquake Engineering COMPDYN 2013, Kos, Greece, June 12-14, 2013.

J. Kopačka, D. Gabriel, R. Kolman, J. Plešek, M. Ulbin. Studies in numerical stability of explicit contact-impact algorithm to the finite element solution of wave propagation problems. In the 4th ECCOMAS Thematic Conference on Computational Methods in Structural Dynamics and Earthquake Engineering COMPDYN 2013, Kos, Greece, June 12-14, 2013.

J. Plešek, J. Kopačka, D. Gabriel, R. Kolman. Contact-impact treatment in explicit transient dynamics using isogeometric analysis with nurbs. In the 4th ECCOMAS Thematic Conference on Computational Methods in Structural Dynamics and Earthquake Engineering COMPDYN 2013, Kos, Greece, June 12-14, 2013.

S.S. Cho, R. Kolman, K.C. Park. A method for computation of wave propagation in heterogeneous solids: implementation and performance. In the Proceedings of the ASME 2013 International Mechanical Engineering Congress & Exposition, IMECE2013, San Diego, USA, November 15-21, 2013.

R. Kolman Radek; S.S. Cho; K.C. Park. Explicit time integrations for finite element computations of wave propagation. Výpočty konstrukcí metodou konečných prvků 2010, Jednodenní seminář, in Czech, FME CTU, Prague, November 28, 2013.

D. Gabriel, J. Kopačka, R. Kolman, J. Plešek, M. Ulbin. Using the bipenalty technique in explicit contact-impact algorithm. In Computational Mechanics 2013. Plzeň : University of West Bohemia, November 4-6, 2013.

Kopačka Ján, Gabriel Dušan, Kolman Radek, Plešek Jiří. Convergence study of an explicit FE contact-impact algorithm based on isogeometric analysis with NURBS. In Computational Mechanics 2013. Plzeň : University of West Bohemia, November 4-6, 2013.

R. Kolman. Isogeometric free vibration of an elastic block. in Splines and IsoGeometric Analysis SIGA 2012. Institute of Thermomechanics ASCR, v.v.i, Prague, CD-ROM, pp. 1-3, 2012.

R. Kolman, J. Plešek, M. Okrouhlík, D. Gabriel. Numerical solution of elastic wave propagation problems by B-spline finite element method. In ECCOMAS YIC 2012, First ECCOMAS Young Investigators Conference, CD-ROM, Aveiro, Portugal, April 24-27, 2012.

- R. Kolman, J. Plešek, M. Okrouhlík. B-spline finite element method in one-dimensional elastic wave propagation problems. In *Engineering Mechanics 2012*, ITAM ASCR, v.v.i., Prague, pp. 657–663, 2012.
- J. Kopačka, R. Kolman, D. Gabriel, J. Plešek. Frictionless contact of elastic bodies: comparison of treatment in finite element analysis and isogeometric analysis. In *Engineering Mechanics 2012*. ITAM AS CR, v.v.i., Prague, pp. 665–671, 2012.
- J. Plešek, R. Kolman, D. Gabriel. Estimation of the critical time step for explicit integration. In *Engineering Mechanics 2012*. ITAM AS CR, v.v.i., Prague, pp. 248–249, 2012.
- V. Sháněl, R. Kolman, J. Plešek. Mass lumping methods for the semi-loof shell element. In *Engineering Mechanics 2012*. ITAM AS CR, v.v.i., Prague, pp. 1161–1171, 2012.
- R. Kolman, B. Bastl, J. Plešek, M. Okrouhlík. Isogeometric free vibration of elastic simple form bodies. In the *Proceedings of the 6th European Congress on Computational Methods in Applied Sciences and Engineering (ECCOMAS 2012)*, CD-ROM , Vienna University of Technology, Vienna, Austria, September 10-14, 2012.
- M. Okrouhlík, R. Kolman. Validity of models and their verification. In the *Proceedings of the 6th European Congress on Computational Methods in Applied Sciences and Engineering (ECCOMAS 2012)*, CD-ROM , Vienna University of Technology, Vienna, Austria, September 10-14, 2012.
- R. Kolman, J. Plešek, M. Okrouhlík, D. Gabriel, J. Kopačka. Numerical solution of elastic wave propagation by isogeometric analysis. In *EUROMECH Colloquium 540 – Advanced Modelling of Wave Propagation in Solids*, Institute of Thermomechanics, ASCR, v.v.i. Prague, Czech Republic, pp. 73-74, October 1-3, 2012.
- J. Kopačka, R. Kolman, D. Gabriel, J. Plešek. Contact treatment in isogeometric analysis. In *Computational mechanics 2012*. Plzeň : University of West Bohemia, 2012.
- R. Kolman, J. Plešek, M. Okrouhlík, D. Gabriel. Spatial dispersion and attenuation analysis of B-spline based finite element method in one-dimensional elastic wave propagation. In *USACM/ICES Thematic Conference IGA 2011, Isogeometric Analysis - Integrating Design and Analysis*, Eds. D. Benson, Y. Bazilevs, T. Hughes, The University of Texas at Austin, Austin, TX, January 13-15, 2011.
- R. Kolman, J. Plešek, M. Okrouhlík, D. Gabriel. Dispersion Errors of B-spline based Finite Element Method in one-dimensional Elastic Wave Propagation. In *3rd ECCOMAS Thematic Conference on Computational Methods in Structural Dynamics and Earthquake Engineering COMPDYN 2011*, Eds. M. Papadrakakis, M. Fragiadakis, V. Plevris, Corfu, Greece, May 25-28, 2011.
- J. Plešek, R. Kolman, D. Gabriel. Studies in Numerical Stability and Critical Time Step Estimation by Wave Dispersion Analysis versus Eigenvalue Computation. In *3rd ECCOMAS Thematic Conference on Computational Methods in Structural Dynamics and Earthquake Engineering COMPDYN 2011*, Eds. M. Papadrakakis, M. Fragiadakis, V. Plevris, Corfu, Greece, May 25-28, 2011.

- R. Kolman, J. Plešek, M. Okrouhlík, D. Gabriel. B-spline finite element response of elastic bar under shock loading. In *Conference HOFEIM 2011 Workshop on Higher Order Finite Element and Isogeometric Methods*, Eds. L. Demkowicz, Cracow, Poland, June 27-29, 2011.
- R. Kolman, J. Plešek, M. Okrouhlík, D. Gabriel. On the spurious oscillations in B-spline finite element method. In *Proceedings of NSCM-24: the 24rd Nordic Seminar on Computational Mechanics*, Eds. J. Freund, R. Kouhia, Aalto University, Helsinki, November 3-4, 2011.
- V. Sháněl, R. Kolman, J. Plešek. Mass lumping methods for the semi-loof shell element. In *Seventh International PhD & DLA Symposium 2011*, Pecs, Hungary, Komló: Rotari Press, Eds. IVANYI, P., 2011, pp. C128.
- J. Červ, R. Kolman, T. Kroupa. Rayleigh-edge waves in thin orthotropic medium. 18th International Congress on Sound and Vibration - ICSV18. Rio de Janeiro : International Institute of Acoustics and Vibration, 2011 - (Musafir, R.), ISBN 978-85-63243-01-0, pp 1–8, 2011.
- R. Kolman, J. Plešek, D. Gabriel. Accuracy of Finite Quadratic Serendipity Elements in Implicit Dynamic Wave Propagation Problems. In *ECCM - ECCOMAS 2010 IV European Conference on Computational Mechanics*, Paris, 2010.
- R. Kolman, J. Plešek, M. Okrouhlík, D. Gabriel. Analysis of classical and spectral finite element spatial discretization in one-dimensional elastic wave propagation. In *Engineering Mechanics 2010*, Praha: Institute of Thermomechanics AS CR, v.v.i., 2010.
- Kolman, Radek; Plešek, Jiří; Okrouhlík, Miloslav; Gabriel, Dušan. Dispersion properties of various finite element spatial discretizations in one-dimensional elastic wave propagation. In *26th conference with international participation COMPUTATIONAL MECHANICS 2010*, Hrad Nečtiny, Czech Republic, November 8 - 10, 2010.
- R. Kolman, J. Kopačka; J. Plešek, M. Okrouhlík, D. Gabriel. Dispersion analysis of B-spline based finite element method for one-dimensional elastic wave propagation. In *Proceedings of NSCM-23: the 23rd Nordic Seminar on Computational Mechanics*, Eds. A. Eriksson, G. Tibert, Stockholm, pp. 255-258, 2010.
- J. Plešek, R. Kolman, D. Gabriel. Accuracy and Stability of Finite Quadratic Serendipity Elements in Dynamic Wave Propagation Problems. In *COMPDYN 2009. ECCOMAS Thematic Conference on Computational Methods in Structural Dynamics and Earthquake Engineering*. Atény: National Technical University of Athens, 2009.
- J. Plešek, R. Kolman, D. Gabriel. Numerical stability of Mass Lumping Schemes for Higher Order Finite Elements. In *International Conference on Complexity of Nonlinear Waves*. Tallin : Tallin University of Technology, 2009.
- J. Plešek, R. Kolman, D. Gabriel. Optimization of lumping schemes for plane square quadratic finite element in elastodynamics. In *WCCM 8 - ECCOMAS 2008*, Venice. Eds. B.A. Schrefler, U. Perego, 2008.
- J. Plešek, R. Kolman, D. Gabriel, F. Valeš. Application of dispersion analysis to the finite element solution of wave propagation and impact problems. In *COMPDYN 2007. Athens : ECCOMAS*, 2007.