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**MATH**

FAKULTÄT FÜR  
MATHEMATIK

# Publikationsbericht 2020

Institut für Analysis und Numerik

# INSTITUT FÜR ANALYSIS UND NUMERIK

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## 1. LEITUNG

Prof. Dr. Peter Benner (MPI Magdeburg)  
Prof. Dr. Klaus Deckelnick  
Prof. Dr. Hans-Christoph Grunau  
Jun. Prof. Dr. Jan Heiland  
Prof. Dr. Thomas Richter (Geschäftsführender Leiter)  
Prof. Dr. Miles Simon  
Prof. Dr. Gerald Warnecke  
Priv.-Doz. Dr. Bernd Rummler

## 2. VERÖFFENTLICHUNGEN

### BEGUTACHTETE ZEITSCHRIFTENAUFsätze

**Ali, Ahmad Ahmad; Deckelnick, Klaus; Hinze, Michael**

Global minima for optimal control of the obstacle problem  
Control, optimisation and calculus of variations: COCV - Les Ulis: EDP Sciences, Volume 26 (2020), article 64,  
22 Seiten;  
[Imp.fact.: 1.181]

**Bause, Markus; Köcher, Uwe; Radu, F. A.; Schieweck, Friedhelm.**

Post-processed Galerkin approximation of improved order for wave equations  
Mathematics of computation - Providence, RI : Soc., Bd. 89 (2020), 322, S. 595-627  
[Imp.fact.: 2.07]

**Benner, Peter; Du, Xin; Yang, Gianghong; Ye, Dan**

Balanced truncation of linear time-invariant systems over finite-frequency ranges  
Advances in computational mathematics - Bussum: Baltzer Science Publ., Volume 46(2020), article number: 82;  
[Imp.fact.: 1.748]

**Benner, Peter; Heinkenschloss, Matthias; Saak, Jens; Weichelt, Heiko K.**

Efficient solution of large-scale algebraic Riccati equations associated with index-2 DAEs via the inexact low-rank  
Newton-ADI method  
Applied numerical mathematics: transactions of IMACS - Amsterdam [u.a.]: Elsevier, Bd. 152.2020, S. 338-354;  
[Imp.fact.: 1.678]

**Benner, Peter; Werner, Steffen W. R.**

Frequency- and time-limited balanced truncation for large-scale second-order systems  
Linear algebra and its applications: LAA - New York, NY: American Elsevier Publ. . - 2020;  
[Online first]  
[Imp.fact.: 0.988]

**Benner, Peter; Werner, Steffen W. R.**

Hankel-norm approximation of large-scale descriptor systems

Advances in computational mathematics - Bussum: Baltzer Science Publ., Volume 46 (2020), article number 40, 31 Seiten;

[Imp.fact.: 1.638]

**Daddi-Moussa-Ider, Abdallah; Sprenger, Alexander R.; Amarouchene, Yacine; Salez, Thomas; Schönecker, Clarissa; Richter, Thomas; Löwen, Hartmut; Menzel, Andreas M.**

Axisymmetric Stokes flow due to a point-force singularity acting between two coaxially positioned rigid no-slip disks

Journal of fluid mechanics - Cambridge [u.a.]: Cambridge Univ. Press, Volume 904 (2020), article A34, 26 Seiten;

[Imp.fact.: 3.137]

**Failer, L.; Richter, Thomas**

A Newton multigrid framework for optimal control of fluidstructure interactions

Optimization and engineering: international multidisciplinary journal to promote optimization theory & applications in engineering science - Dordrecht [u.a.]: Springer Science + Business Media B.V. - 2020;

[Online first]

[Imp.fact.: 1.824]

**Failer, L.; Richter, Thomas**

A parallel Newton multigrid framework for monolithic fluid-structure interactions

Journal of scientific computing - New York, NY [u.a.]: Springer Science + Business Media B.V., Volume 82(2020), article 28;

[Imp.fact.: 2.228]

**Frei, Stefan; Richter, Thomas**

Efficient approximation of flow problems with multiple scales in time

Multiscale modeling & simulation - Philadelphia, Pa.: SIAM, Bd. 18.2020, 2, S. 942-969, insges. 28 S.;

[Gesehen am 04.08.2020]

**Grunau, Hans-Christoph; Miyake, Nobuhito; Okabe, Shinya**

Positivity of solutions to the Cauchy problem for linear and semilinear biharmonic heat equations

Advances in nonlinear analysis - Berlin: de Gruyter, Bd. 10.2020, 1, S. 353-370;

[Imp.fact.: 2.667]

**Grunau, Hans-Christoph; Romani, Giulio; Sweers, Guido**

Differences between fundamental solutions of general higher order elliptic operators and of products of second order operators

Mathematische Annalen - Berlin: Springer . - 2020;

[Online first]

[Imp.fact.: 1.356]

**Kemm, Friedemann; Gaburro, Elena; Thein, Ferdinand; Dumbser, Michael**

A simple diffuse interface approach for compressible flows around moving solids of arbitrary shape based on a reduced Baer-Nunziato model

Computers & fluids: an international journal - Amsterdam [u.a.]: Elsevier Science, Volume 204 (2020), article 104536;

[Imp.fact.: 2.223]

**Kunik, Matthias**

New insight into results of Ostrowski and Lang on sums of remainders using Farey sequences

Online journal of analytic combinatorics: OJAC - Columbia, Miss.: Univ. of Missouri . - 2020, 15, insges. 11 S.;

**Mehlmann, Carolin; Richter, Thomas**

A goal oriented error estimator and mesh adaptivity for sea ice simulations

Ocean modelling online - Amsterdam [u.a.]: Elsevier Science, Volume 154(2020), article 101684;

[Imp.fact.: 3.215]

**Minakowski, Piotr; Mucha, Piotr B.; Peszek, Jan**

Density-induced consensus protocol

Mathematical models and methods in applied sciences (M 3 AS) - Singapore [u.a.]: World Scientific, Bd. 30.2020, 12, S. 2389-2415;  
[Imp.fact.: 3.044]

**Minakowski, Piotr; Richter, Thomas**

Finite element error estimates on geometrically perturbed domains

Journal of scientific computing - New York, NY [u.a.]: Springer Science + Business Media B.V., 84(2020,2)  
Artikel-Nummer 30, 19 Seiten;  
[Gesehen am 05.10.2020]  
[Imp.fact.: 2.228]

**Simon, Miles**

Some integral curvature estimates for the Ricci flow in four dimensions

Communications in analysis and geometry - Somerville, Mass.: Internat. Press, Bd. 28.2020, 3, S. 707-727;  
[Imp.fact.: 0.694]

**Sonner, Florian; Richter, Thomas**

Second order pressure estimates for the Crank-Nicolson discretization of the incompressible Navier-Stokes Equations

SIAM journal on numerical analysis/ Society for Industrial and Applied Mathematics - Philadelphia, Pa.: SIAM, Bd. 58.2020, 1, S. 375-409, insges. 35 S.;  
[Gesehen am 05.08.2020]

**Warnecke, Gerald**

Ein Brief von C.F. Gauß an C.L. Gerling - kleinste Fehlerquadrate und das Gauß-Seidel-Verfahren  
Mathematische Semesterberichte - Berlin: Springer, Bd. 67.2020, S. 57-84;

**Weinhandl, Roman; Benner, Peter; Richter, Thomas**

Lowrank linear fluidstructure interaction discretizations

ZAMM: journal of applied mathematics and mechanics - Berlin: Wiley-VCH . - 2020;  
[Online first]  
[Imp.fact.: 1.103]

**Weinhandl, Roman; Benner, Peter; Richter, Thomas**

Lowrank linear fluidstructure interaction discretizations

ZAMM: journal of applied mathematics and mechanics - Berlin: Wiley-VCH, Volume 100(2020),issue 1, Artikel e201900205;

**NICHT BEGUTACHTETE ZEITSCHRIFTENAUFsätze**

**Barrett, John W.; Styles, Vanessa; Deckelnick, Klaus**

A practical phase field method for an elliptic surface PDE

Magdeburg: Otto-von-Guericke-Universität, Fakultät für Mathematik, 2020, 24 Seiten - (Preprint; Fakultät für Mathematik, Otto-von-Guericke-Universität Magdeburg; 2020, Nr. 03);  
[Literaturangaben: Seite 22-24]

**Benner, Peter; Richter, Thomas; Weinhandl, Roman**

A low-rank approach for nonlinear parameter-dependent fluid-structure interaction problems

De.arxiv.org - [S.l.]: Arxiv.org, 2020, article 1911.08193, 7 Seiten, 2019;

**Deckelnick, Klaus; Doemeland, Marco; Grunau, Hans-Christoph**

Boundary value problems for the Helfrich functional for surfaces of revolution - existence and asymptotic behavior

Magdeburg: Universität, Fakultät für Mathematik, 2020, 29 Seiten, Diagramme - (Preprint; Fakultät für Mathematik, Otto-von-Guericke-Universität Magdeburg; 2020, Nr. 04);  
[Literaturverzeichnis: Seite 27-29]

**Deckelnick, Klaus; Nürnberg, Robert**

Error analysis for a finite difference scheme for axisymmetric mean curvature flow of genus-0 surfaces

Magdeburg: Universität, Fakultät für Mathematik, 2020, 24 Seiten - (Preprint; Fakultät für Mathematik, Otto-von-Guericke-Universität Magdeburg; 2020, Nr. 06);

[Literaturverzeichnis: Seite 20-22]

**Kunik, Matthias**

Further results and examples for formal mathematical systems with structural induction

Magdeburg: Otto-von-Guericke-Universität, Fakultät für Mathematik, 2020, 37 Seiten - (Preprint; Fakultät für Mathematik, Otto-von-Guericke-Universität Magdeburg; 2020, Nr. 05)

**Kunik, Matthias; Liu, Hailian; Warnecke, Gerald**

Radially symmetric solutions of the ultra-relativistic Euler equations

Magdeburg: Otto-von-Guericke-Universität, Fakultät für Mathematik, 2020, 25 Seiten, Illustrationen - (Preprint; Fakultät für Mathematik, Otto-von-Guericke-Universität Magdeburg; 2020, Nr. 02);

[Literaturangaben: Seite 24-25]

## BEGUTACHTETE BUCHBEITRÄGE

**Brenner, Peter; Werner, Steffen W. R.**

MORLAB - a model order reduction framework in MATLAB and octave

Mathematical Software - ICMS 2020: 7th International Conference, Braunschweig, Germany, July 13-16, 2020, Proceedings/ International Congress on Mathematical Software - Cham: Springer International Publishing, 2020

. - 2020, S. 432-441 - (Lecture Notes in Computer Science; 12097);

**Gosea, Ion Victor; Duff, Igor Pontes; Benner, Peter; Antoulas, Athanasios C.**

Model order reduction of switched linear systems with constrained switching

IUTAM Symposium on Model Order Reduction of Coupled Systems, Stuttgart, Germany, May 22-25, 2018: MORCOS 2018 - Cham: Springer, 2020; Fehr, Jörg . - 2020, S. 41-53;

[Symposium: IUTAM Symposium on Model Order Reduction of Coupled Systems, Stuttgart, Germany, May 22-25, 2018]

**Hantke, Maren; Matern, Christoph; Warnecke, Gerald**

Analytical results for the Riemann problem for a weakly hyperbolic two-phase flow model of a dispersed phase in a carrier fluid

Continuum mechanics, applied mathematics and scientific computing: Godunov's legacy: a liber amicorum to Professor Godunov - Cham: Springer, 2020; Demidenko, Gennadii V. . - 2020, S. 169-175;

**Hantke, Maren; Thein, Ferdinand**

A numerical method for two phase flows with phase transition including phase creation

Continuum mechanics, applied mathematics and scientific computing: Godunov's legacy: a liber amicorum to Professor Godunov - Cham: Springer, 2020; Demidenko, Gennadii V. . - 2020, S. 177-183;

## DISSERTATIONEN

**Mierswa, Alina; Deckelnick, Klaus [AkademischeR BetreuerIn]**

Error estimates for a finite difference approximation of mean curvature flow for surfaces of torus type

Magdeburg, 2020, 99 Seiten, Illustrationen, Diagramme, 30 cm;

[Literaturverzeichnis: Seite 97-99]

**Mlinari, Petar; Benner, Peter [AkademischeR BetreuerIn]**

Structure-preserving model order reduction for network systems

Magdeburg, 2020, xxiii, 153 Seiten, Diagramme, 30 cm;

[Literaturverzeichnis: Seite 141-150]

**Munir, Taj; Warnecke, Gerald [AkademischeR BetreuerIn]**

Analysis of coupling interface problems for bi-domain diffusion equations

Magdeburg, 2020, x, 151 Seiten, Diagramme, 30 cm;

[Literaturverzeichnis: Seite 149-151]

**Weinhandl, Roman; Benner, Peter [AkademischeR BetreuerIn]; Richter, Thomas [AkademischeR BetreuerIn]**

Low-rank methods for parameter-dependent fluid-structure interaction problems

Magdeburg, 2020, xx, 129 Seiten, Formeln;

[Literaturverzeichnis: Seite 121-126]