



Jörn Lothar Sesterhenn

Curriculum Vitae

Professional Career

- 09/2015– **Vice Director**, *Institut für Strömungsmechanik und Technische*, TU Berlin, Berlin.
- 04/2011– **Director**, *Institut für Strömungsmechanik und Technische Akustik*, TU Berlin, Berlin.
09/2015
- 04/2014– **Acting Professor for**, “*Signale und Systeme der Akustik*”, TU Berlin, Berlin.
- 07/2012– **Acting Professor for**, “*Technische Akustik*”, TU Berlin, Berlin.
- 2009– **Professor for Numerical Fluid-dynamics**, (*full*) TU Berlin, Berlin.
- 2006–2009 **Professor for Numerical Methods in Aero– and Space Technology** , (*associate*) *Universität der Bundeswehr München (University of the Armed Forces)* , Neubiberg.
Director of the Computing Centre (RZL) of the Department for Aero– and Space Technology
- 2001–2006 **Wissenschaftlicher Assistent (predecessor of the Juniorprofessor)** , *Institut for Fluidmechanics, (C1)* TU München, Garching.
- 1997–2001 **Researcher**, *Institut für Fluidmechanik*, TU München, Garching.
with Prof. R. Friedrich
- 1996–1997 **PostDoc and Lecturer**, *Dept. Applied Math*, University of Washington.
with R. LeVeque
- 1991–1996 **Assistant**, *Institut für Fluidmechanik*, ETH Zürich.

Academic Education

Habilitation 2004

Subject *Aeroacoustics*
Referees Rainer Friedrich & Leonhard Kleiser
University TU München

Postdoctorate 1996/97

Topic *Numerical Simulation of Gravity Driven Density Currents*
Referee R. LeVeque (Applied Mathematics)
University University of Washington

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Doktorate 1995

Title *Über die numerische Berechnung kompressibler Strömungen bei kleinen Mach-Zahlen*
Referees Hans Thomann (Fluidmechanics) & Rolf Jeltsch (Applied Mathematics)
University ETH Zürich

Studies

1987–1990 **Diplom Maschineningenieurwesen**, *Eidgenössisch Technische Hochschule*, Zürich, Major Engineering Mathematics and Fluidmechanics.
Awarded the Silvermedal of the ETH
1985–1987 **Pre-diploma Engineering**, *TU München*, München.

Scholarly visits

03/2015 – **La Sapienza**, *Rom*, Dipartimento di Meccanica e Aeronautica.
09/2015
03/2010 – **Università degli Studi di Messina**, *Messina*, Dipartimento di Matematica e Informatica .
04/2010

Participation in academic administration

1993–1996 Fakultätsrat Dept. Maschinenbau und Verfahrenstechnik, ETH Zürich
2008–2009 Fakultätsrat Fak. Luft- und Raumfahrttechnik UniBW
2010–2012 Fakultätsrat Fak. Maschinenbau und Verkehrswesen TUB
2012– Member of the “Strategie AG”
2010– Member of the curriculum committee “Physikalische Ingenieurwissenschaften”
2007–2015 Head or member of several search commissions

Promotion of young and female researchers

Comitte activities

2014– Scientific Director of the *Berlin International Graduate School in Model and Simulation based Research* <http://www.bimos.tu-berlin.de/>
2012– Head of the Girls-lab “Schülerinnenlabor” of the *SFB 1029* <https://www.sfb1029.tu-berlin.de/menue/schuelerinnenlabor/>
2012– Comitee of the graduate college of the *SFB 1029*

Recurrent events

2009 – Jugend Forscht
2009 – Lange Nacht der Wissenschaft
2009 – Girls-Day

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Workshops for Young Researchers

- 2015 Workshop "Modeling of fragmentation processes during volcanic eruptions and ash dispersal in turbulent jets", Perugia
- 2014 Workshop "Data Assimilation", Cortona (SFB 1029)
- 2013 Workshop "Adjoint Methods", Montecatini Terme (SFB 1029)
- 2008 2st Young ERCOFTAC Workshop "Model Reduction", Montestigliano
- 2007 1nd Young ERCOFTAC Workshop "Flow Control", Montestigliano
- 2006 ERCOFTAC (SIG4) Workshop "Compressible Turbulence and Aeroacoustics", Oleron
- 2004 ERCOFTAC (SIG4) Workshop "Compressible Turbulence and Aeroacoustics", Strasbourg

Selected Lectures

- UW Seattle Variational Calculus
- TU München Kompressible Scherströmungen, Computational Aeroacoustics (Studiengang Computational Science Engineering, in Englisch)
- UniBW M Numerische Mathematik I&II, Einführung in Matlab
- TU Berlin Computational Fluidynamics I-III, Computational Aeroacoustics I-II, Introduction in Matlab, Control and Modellreduktion, Gasdynamics
- La Sapienza Modelling and Simulation of Turbulent Flows

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Third party projects (only present)

Colaborative Research Groups

- DFG **Entwicklung eines reduzierten Modells eines Pulsed Detonation Combusters, (SFB1029).**
- DFG **Numerische Untersuchung der Physik von druckerhöhenden, pulsierenden Verbrennungen, (SFB1029).**
- DFG **Numerische Simulation und Optimierung von pulsierenden Prallstrahlarrays, (SFB1029).**
- EU-FP7 **Non-intrusive Optical Pressure and Loads Extraction for Aerodynamic Analysis, (NIOPLEX).**
- EU-FP7 **Laboratory simulations of gas-pyroclast flows: Investigating the effect of particle concentration, electrification, aggregation and re-entrainment in a recirculating windtunnel, (VERTIGO).**

Fundamental Research

- DFG **Formoptimierung und Sensitivitätsanalyse eines überströmten Liners.**
- DFG **Analyse und Beeinflussung von Stoßschwingungen mit Hilfe adjungierter Funktionen.**

Industrial Projects

- DFG **Leistungssteigerung von Strömungsmaschinen durch aktive Sekundärströmungsbeeinflussung in einer Verdichterstufe.**

Personal Information

- born **25.12.1965**, *Neuwied am Rhein*, Germany.
- married **since 1991**.
- children **two daughters**, *Iphigenie (1993) & Penelope (1996)*.
- Religion **roman catholic**.

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Publikationen

Zeitschriften

Jens Brouwer, Julius Reiss, and Jörn Sesterhenn. Conservative time integrators of arbitrary order for skew-symmetric finite-difference discretizations of compressible flow. *Computers & Fluids*, 100(0):1 – 12, 2014.

Thomas Engels, Dmitry Kolomenskiy, Kai Schneider, and Jörn Sesterhenn. Two-dimensional simulation of the fluttering instability using a pseudospectral method with volume penalization. *Computers & Structures*, 2013.

Thomas Engels, Dmitry Kolomenskiy, Kai Schneider, and Jörn Sesterhenn. Numerical modeling of flexible insect wings using volume penalization. *Bulletin of the American Physical Society*, 57, 2012.

Thomas Engels, Dmitry Kolomenskiy, Kai Schneider, and Jörn Sesterhenn. Numerical simulation of the fluttering instability using a pseudospectral method with volume penalization. *Bulletin of the American Physical Society*, 58, 2013.

Thomas Engels, Dmitry Kolomenskiy, Kai Schneider, and Jörn Sesterhenn. Numerical simulation of fluid–structure interaction with the volume penalization method. *Journal of Computational Physics*, 281:96 – 115, 2015.

D. Fabre, L. Jacquin, and J. Sesterhenn. Linear interaction of a cylindrical entropy spot with a shock. *Physics of Fluids*, 13(8):2403–2422, August 2001.

Rainer Friedrich, Holger Foysi, and Jörn Sesterhenn. Turbulent momentum and passive scalar transport in supersonic channel flow. *Journal of the Brazilian Society of Mechanical Sciences and Engineering*, 28(2):174–185, 2006.

Somnath Ghosh, Jörn Sesterhenn, and Rainer Friedrich. Large-eddy simulation of supersonic turbulent flow in axisymmetric nozzles and diffusers. *International Journal of Heat and Fluid Flow*, 29(3):579–590, 2008.

R. Lechner, J. Sesterhenn, and R. Friedrich. Turbulent supersonic channel flow. *Journal of Turbulence*, 2:2–25, January 2001.

Mathias Lemke, Julius Reiss, and Jörn Sesterhenn. Adjoint based optimisation of reactive compressible flows. *Combustion and Flame*, 161(10):2552 – 2564, 2014.

Mathias Lemke, Jan Schulze, and Jörn Sesterhenn. Adjoint-based reconstruction of an entropy source by discrete temperature measurements. *Int. J. Computational Science and Engineering*, 9(5/6):526–537, 2014.

Christoph J Mack, Peter J Schmid, and Jörn L Sesterhenn. Global stability of swept flow around a parabolic body: connecting attachment-line and crossflow modes. *Journal of Fluid Mechanics*, 611(1):205–214, 2008.

I Mahle, J Sesterhenn, and R Friedrich. Large eddy simulation of turbulent reacting shear layers including finite-rate chemistry and detailed diffusion processes. *Flow, Turbulence and Combustion*, 80(1):81–105, 2008.

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Inga Mahle, Jörn Sesterhenn, and Rainer Friedrich. Turbulent mixing in temporal compressible shear layers involving detailed diffusion processes. *Journal of Turbulence*, (8), 2007.

Joseph Mathew, Richard Lechner, Holger Foyi, Jörn Sesterhenn, and Rainer Friedrich. An explicit filtering method for large eddy simulation of compressible flows. *Physics of fluids*, 15:2279, 2003.

J Matthew, R Lechner, H Foyi, J Sesterhenn, and R Friedrich. An explicit filtering method for les of compressible flows. *Phys. Fluids*, 15:2279, 2003.

M. Pauly, M. Sroka, J. Reiss, G. Rinke, A. Albarghash, R. Vogelgesang, H. Hahne, B. Kuster, J. Sesterhenn, K. Kern, and S. Rauschenbach. A hydrodynamically optimized nano-electrospray ionization source and vacuum interface. *Analyst*, 139:1856–1867, 2014.

Julius Reiss and Jörn Sesterhenn. Fully conservative, skew-symmetric finite difference schemes for compressible flows on distorted grids. *PAMM*, 11(1):785–786, 2011.

Julius Reiss and Jörn Sesterhenn. A conservative, skew-symmetric finite difference scheme for the compressible navier–stokes equations. *Computers & Fluids*, 101(0):208 – 219, 2014. see also [arXiv:1308.6672].

Ch Schaupp, J Sesterhenn, and R Friedrich. On a method for direct numerical simulation of shear layer/compression wave interaction for aeroacoustic investigations. *Computers & Fluids*, 37(4):463–474, 2008.

J Schulze, P Schmid, and J Sesterhenn. Iterative optimization based on an objective functional in frequency-space with application to jet-noise cancellation. *Journal of Computational Physics*, 230(15):6075–6098, 2011.

J Schulze and J Sesterhenn. Adjoint based noise minimization of a round supersonic jet. *Journal of Physics: Conference Series*, 318(9):092005, 2011.

J Schulze and J Sesterhenn. Optimal distribution of porous media to reduce trailing edge noise. *Computers & Fluids*, 2012.

Jan Schulze and Jörn Sesterhenn. Numerical simulation of supersonic jet-noise. *PAMM*, 8(1):10703–10704, 2008.

Jan Schulze and Jörn Sesterhenn. Numerical simulation of supersonic jet noise with overset grid techniques for highly parallelized computing. *High Performance Computing in Science and Engineering, Garching/Munich 2009*, pages 99–108, 2010.

JC Schulze, PJ Schmid, and JL Sesterhenn. Exponential time integration using krylov subspaces. *International journal for numerical methods in fluids*, 60(6):591–609, 2009.

Jörn Sesterhenn. A characteristic-type formulation of the Navier–Stokes equations for high order upwind schemes. *Computers & Fluids*, 30(1):37–67, 2001.

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Jörn Sesterhenn, Jean-François Dohogne, and Rainer Friedrich. Direct numerical simulation of the interaction of isotropic turbulence with a shock wave using shock-fitting. *Comptes Rendus Mécanique*, 333(1):87–94, 2005.

Jörn Sesterhenn, Bernhard Müller, and Hans Thomann. Flux-vector splitting for compressible low mach number flow. *Computers & fluids*, 22(4):441–451, 1993.

Jörn Sesterhenn, Bernhard Müller, and Hans Thomann. On the cancellation problem in calculating compressible low mach number flows. *Journal of Computational Physics*, 151(2):597–615, 1999.

Robert Wilke and Jörn Sesterhenn. Direct numerical simulation of heat transfer of a round subsonic impinging jet. In Rudibert King, editor, *Active Flow and Combustion Control 2014*, volume 127 of *Notes on Numerical Fluid Mechanics and Multidisciplinary Design*, pages 147–159. Springer International Publishing, 2015.

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Proceedings

Sergio Bengoechea, Lewin Stein, Julius Reiss, and Jörn Sesterhenn. Numerical investigation of reactive and non-reactive Richtmyer-Meshkov instabilities. In Rudibert King, editor, *Active Flow and Combustion Control 2014*, volume 127 of *Notes on Numerical Fluid Mechanics and Multidisciplinary Design*, pages 343–361. Springer International Publishing, 2015.

Jens Brouwer, Julius Reiss, and Jörn Sesterhenn. Fully conservative finite-difference schemes of arbitrary order for compressible flow. *AIP Conference Proceedings*, 1479:2290, 2012.

Jens Brouwer, Julius Reiss, and Jörn Sesterhenn. Conservative finite differences as an alternative to finite volume for compressible flows. In Jürgen Fuhrmann, Mario Ohlberger, and Christian Rohde, editors, *Finite Volumes for Complex Applications VII-Methods and Theoretical Aspects*, volume 77 of *Springer Proceedings in Mathematics & Statistics*, pages 169–176. Springer International Publishing, 2014.

Polifke W. Rieger D. Yan J. Sesterhenn J. Durand, L. Implementation and validation of models in a les/dns solver for premixed turbulent combustion. *SBF 568-Workshop, Heidelberg, Germany, 2004.*, 2(3):19, 2004.

Rainer Friedrich, J Sesterhenn, D Juve, and C Bailly. Sub-project sp2: Shock induced noise in supersonic jets. Technical report, Technical report, DFG-CNRS, 2005.

S Ghosh, J Sesterhenn, and Rainer Friedrich. Dns and les of compressible turbulent pipe flow with isothermal wall. In *Direct and Large-Eddy Simulation VI*, pages 721–728. Springer, 2006.

Arne Heinrich, Flavia Cavalcanti Miranda, and Jörn Sesterhenn. Dns investigation of a particle laden compressible turbulent boundary layer on an inclined plate using two-way coupling. European Turbulence Conference 14, 2013.

O. Henze, M. Lemke, and J. Sesterhenn. A parallel and matrix free framework for global stability analysis of compressible flows. Technical report, Institut für Strömungsmechanik und Technische Akustik, Technische Universität Berlin, 2015. arXiv:1502.03701 [physics.flu-dyn].

S. Hossbach, R. Wilke, and J. Sesterhenn. Identification of material vortices. In D. Borello M. Hadzabdic P. Venturini K. Hanjalic, T. Miyauchi, editor, *Turbulence, Heat and Mass Transfer 8*, number 8, pages 121–124. Begell House Inc., September 2015.

Anne Le Duc, Jörn Sesterhenn, and Rainer Friedrich. Direct numerical simulation of instabilities in the compressible swept hiemenz flow. In *Recent Results in Laminar-Turbulent Transition*, pages 135–148. Springer, 2004.

M Lemke, J Schulze, and J Sesterhenn. Reconstruction of an entropy source by temperature measurements at discrete points with adjoint methods. *AIP Conference Proceedings*, 1389:1898, 2011.

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M Lemke, J Schulze, and J Sesterhenn. Reconstruction of an entropy source by temperature measurements at discrete points with adjoint methods. In *NUMERICAL ANALYSIS AND APPLIED MATHEMATICS ICNAAM 2011: International Conference on Numerical Analysis and Applied Mathematics*, volume 1389, page 1898. AIP Publishing, 2011.

M. Lemke, C. Westphal, J. Reiss, and J. Sesterhenn. Adjoint based data assimilation of sound sources. In Stefan Becker, editor, *Fortschritte der Akustik - DAGA 2015*, pages 635–638. DEGA, March 2015. ISBN 978-3-939296-08-9.

Mathias Lemke, Agnieszka Międlar, Julius Reiss, Volker Mehrmann, and Jörn Sesterhenn. Model reduction of reactive processes. In Rudibert King, editor, *Active Flow and Combustion Control 2014*, volume 127 of *Notes on Numerical Fluid Mechanics and Multidisciplinary Design*, pages 397–413. Springer International Publishing, 2015.

Mathias Lemke, Julius Reiss, and Jörn Sesterhenn. Adjoint-based analysis of thermoacoustic coupling. *AIP Conference Proceedings*, 1558(1):2163–2166, 2013.

Mathias Lemke and Jörn Sesterhenn. Adjoint based pressure determination from piv-data –validation with synthetic piv measurements–. In *PIV13; 10th International Symposium on Particle Image Velocimetry, Delft, The Netherlands, July 1-3, 2013*. Delft University of Technology, Faculty of Mechanical, Maritime and Materials Engineering, and Faculty of Aerospace Engineering, 2013. uuid:04ba1825-7598-487f-adbe-96474149cd21.

Christoph J Mack, Peter J Schmid, and Jörn Sesterhenn. Global stability analysis of compressible flow around swept wings. In *New Results in Numerical and Experimental Fluid Mechanics VII*, pages 249–256. Springer, 2010.

I Mahle, JP Mellado, J Sesterhenn, R Friedrich, and Sevilla de Ingenieros. Les of reacting turbulent shear layers using infinitely fast chemistry. *Contribution to: Turbulence and Interaction*, 2006.

Inga Mahle, Juan Pedro Mellado, Jörn Sesterhenn, and Rainer Friedrich. Les of turbulent low mach number shear layers with active scalars using explicit filtering. In *Progress in Turbulence II*, pages 257–260. Springer, 2007.

Inga Mahle, Jörn Sesterhenn, and Rainer Friedrich. Dissipation of active scalars in turbulent temporally evolving shear layers with density gradients caused by multiple species. In *Direct and Large-Eddy Simulation VI*, pages 109–116. Springer, 2006.

Inga Mahle, Jörn Sesterhenn, and Rainer Friedrich. Dns of compressible inert and infinitely fast reacting mixing layers. In *New Results in Numerical and Experimental Fluid Mechanics VI*, pages 372–380. Springer, 2008.

F. Cavalcanti Miranda, A. Heinrich, J. Schulze, and J. Sesterhenn. Direct numerical simulation of a turbulent round jet with particles in suspension. In *5th Chaotic Modeling and Simulation International Conference*, 2012.

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F. Cavalcanti Miranda, A. Heinrich, and J. Sesterhenn. The influence of the fluid acceleration term on the simulation of a particle-laden compressible jet with shock waves. In *European Turbulence Conference 14*, 2013.

B Müller, J Sesterhenn, and H Thomann. Preconditioning and flux vector splitting for compressible low mach number flow. In *Thirteenth International Conference on Numerical Methods in Fluid Dynamics*, pages 125–129. Springer, 1993.

J Reiss and J Sesterhenn. Fully conservative, skew symmetric and compact finite difference schemes. *AIP Conference Proceedings*, 1168:290, 2009.

J Reiss and J Sesterhenn. Calculation of shocks with skew symmetric schemes. *AIP Conference Proceedings*, 1389:1894, 2011.

Julius Reiss and Jörn Sesterhenn. Conservative, skew–symmetric discretization of the compressible navier–stokes equations. In *New Results in Numerical and Experimental Fluid Mechanics VIII*, pages 395–402. Springer, 2013.

J Schulze, Ch Schaupp, J Sesterhenn, R Friedrich, J Berland, Ch Bogey, and D Juvé. Shock-induced noise in 2d sub-and supersonic mixing layers. *ESAIM: Proceedings*, 16:51–65, 2007.

J. Schulze and J. Sesterhenn. Computing supersonic jet-noise. In *Proceedings of CFML 2009*, Marseille, 2009.

J Schulze and J Sesterhenn. Numerical simulation of supersonic jet noise with overset grid techniques. In *Turbulence and Interactions*, pages 327–336. Springer, 2010.

Jan Schulze and J Sesterhenn. Optimal control to reduce supersonic jet noise. In *New Results in Numerical and Experimental Fluid Mechanics VIII*, pages 707–714. Springer, 2013.

Jan Schulze, Jörn Sesterhenn, Peter Schmid, Christophe Bogey, Nicolas de Cacqueray, Julien Berland, and Christophe Bailly. Numerical simulation of supersonic jet noise. In *Numerical Simulation of Turbulent Flows and Noise Generation*, pages 29–46. Springer, 2009.

J Sesterhenn and R Friedrich. Effects of compressibility and nose radius on instabilities near the attachment line of swept wings. In *IUTAM Symposium on Laminar-Turbulent Transition*, pages 173–179. Springer, 2006.

J. Sesterhenn and R. Friedrich. *Transition and Turbulence Control*, chapter Instabilities near the attachment line of swept wings. World Scientific Publishers, Singapore, 2006.

Jörn Sesterhenn and Rainer Friedrich. Numerical receptivity study of an attachment boundary-layer in hypersonic flow. In *EUROMECH conference*, pages 149–154, 2002.

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Jörn Sesterhenn and Rainer Friedrich. Crossflow vortices near the attachment line of a swept airfoil at $M=8$. In *Direct and Large-Eddy Simulation V*, pages 241–248. Springer, 2004.

Jörn Sesterhenn and Rainer Friedrich. Receptivity study of the attachment-line instability on a blunt body in supersonic flow. In *New Results in Numerical and Experimental Fluid Mechanics IV*, pages 311–318. Springer, 2004.

Jörn Sesterhenn and Rainer Friedrich. Instabilities near the attachment-line of a swept wing in compressible flow. In *IUTAM Symposium on One Hundred Years of Boundary Layer Research*, pages 363–372. Springer, 2006.

Jörn Sesterhenn, Richard Lechner, and Rainer Friedrich. Dns of compressible turbulence. *GAMM-Jahrestagung, Göttingen*, 2000.

Jörn Sesterhenn, Flavia Cavalcanti Miranda, and JJ Pena Fernandez. Numerical simulation of starting, particle-laden jets from pressurised containments. In *EGU General Assembly Conference Abstracts*, volume 15, page 4817, 2013.

Jörn Sesterhenn. Upwind and high-resolution schemes: edited by my hussaini, v. van leer, j. van rosendale (springer-verlag gmbh & co. kg, heidelberg, 1997, 588 pp.) dm 248.00 ös 1 810.40 sfr 216.00 hc isbn 3 540 616551, 1998.

Jörn Sesterhenn, Flavia Cavalcanti Miranda, Juan Jose Pena Fernandez, and Arne Heinrich. Numerical simulation of starting, particle-laden jets from pressurised containments. In *European Geosciences Union, General Assembly 2013*, 2013.

Robert Wilke and Jörn Sesterhenn. Direct numerical simulation of heat transfer of a round subsonic impinging jet. In Rudibert King, editor, *Active Flow and Combustion Control 2014*, volume 127 of *Notes on Numerical Fluid Mechanics and Multidisciplinary Design*, pages 147–159. Springer International Publishing, 2015.

Patente

Matthias Dr Pauly, Gordon Rinke, Ralf Dr Vogelgesang, Artur Küster, Klaus Prof Dr Kern, Julius Reiss, Jörn Sesterhenn, Mario Sroka, et al. Device for transferring ions from high to low pressure atmosphere, system and use, February 21 2012. EP Patent App. 20,120,156,326.

Stephan RAUSCHENBACH, Matthias Pauly, Gordon Rinke, Ralf VOGELGESANG, Artur KUESTER, Klaus Kern, Julius Reiss, Jörn Sesterhenn, Mario Sroka, et al. Device for transferring ions from high to low pressure atmosphere, system and use, February 21 2013. WO Patent App. PCT/EP2013/053,471.

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