Elisa Francini

Dipartimento di Matematica e Informatica, Università di Firenze, viale Morgagni 67A - 50134 Firenze
| mobile: +39 3358368229 | email: elisa.francini@unifi.it | http://web.math.unifi.it/users/francini

Born in Firenze, Italy on September 12, 1969. Nationality: Italian. Married, 2 children.

Current position
Associate Professor of Mathematical Analysis, Università di Firenze.

Education
PHD IN MATHEMATICS | 1998 | UNIVERSITÀ DI FIRENZE
· Graduated by a national committee. Thesis title: ``On level lines of solutions of elliptic and parabolic equations''. Advisor: Prof. Giorgio Talenti.

M.S. IN MATHEMATICS | 1992 | UNIVERSITÀ DI FIRENZE
· Graduated with honors. Thesis title: ``Properties of the gradient of solutions of elliptic partial differential equations''. Advisor: Prof. Carlo Pucci.

ASN | 2019 |
On May 10th, 2019 I have obtained the Italian National Scientific Habilitation as Full Professor in Mathematical Analysis, Probability and Mathematical Statistics.

Appointments held
2005-present, Associate professor in Mathematical Analysis at the Universit\`{a} di Firenze.\\

1995-2005, Researcher of the Consiglio Nazionale delle Ricerche (CNR) at the "Istituto di Analisi Globale e Applicazioni", Firenze.

Grants
2019-2021, Participant of the Italian grant PRIN 2017, " Direct and inverse problems for partial differential equations: theoretical aspects and applications ''.

2017-2020, Participant to the National Project "Strategic Initiatives for the Enviroment and Security" of the Istituto Nazionale di Alta Matematica.

2013-2017, Participant of the Italian grant FIR 2013 "Geometrical and qualitative aspects of PDEs".

2010-2012, Participant of the Italian grant PRIN 2008, "Identificazione di coefficienti e di insiemi

incogniti in equazioni alle derivate parziali e sistemi da misure al bordo''.

2007-09, Participant of the Italian grant PRIN 2006, "Problemi al contorno inversi: determinazione

di coefficienti e frontiere incognite''.

2004-06, Participant of the Italian grant PRIN 2004, "Problemi di identificazione per equazioni ellittiche e paraboliche''.

1998-99, Italian (CNR) Fellowship as visiting scholar at the University of Washington, Seattle WA.

1993-1995, Fellowship for PhD in Mathematics, Università di Firenze.

1992-93, Fellowship of the Istituto Nazionale di Alta Matematica in Roma for advanced courses.

Publications

[1] Beretta E., Francini E. (In corso di stampa). Global Lipschitz stability estimates for polygonal conductivity inclusions from boundary measurements. APPLICABLE ANALYSIS.

[2] Shi J.; Beretta E.; de Hoop M.V.; Francini E.; Vessella S. (2020). A numerical study of multi-parameter full waveform inversion with iterative regularization using multi-frequency vibroseis data. COMPUTATIONAL GEOSCIENCES, vol. 24, pp. 89-107.

[3] Francini E., Franzina G., Vessella S. (2020). Existence and regularity for eddy current system with non-smooth conductivity. SIAM JOURNAL ON MATHEMATICAL ANALYSIS, vol. 52, pp. 2134-2157

[4] Beretta E., Francini E., Vessella S. (2019) A transmission problem on a polygonal partition: regularity and shape differentiability. APPLICABLE ANALYSIS, vol. 98, pp. 1862-1874

[5] Francini E., Vessella S. (2018) Carleman estimates for the parabolic transmission problem and Hölder propagation of smallness across an interface. JOURNAL OF DIFFERENTIAL EQUATIONS, vol. 265, pp. 2375-2430

[6]   Di Fazio, G., Francini E., Raciti F., Vessella S. (2017) Stable determination of a Lamé coefficient by one internal measurement of displacement. JOURNAL OF MATHEMATICAL ANALYSIS AND APPLICATIONS, vol. 452, pp. 388-400.

[7]   Beretta E., De Hoop M.V., Francini E., Vessella S., Zhai J. (2017) Uniqueness and Lipschitz stability of an inverse boundary value problem for time-harmonic elastic waves. INVERSE PROBLEMS, vol. 33, 035013.

[8]   Di Cristo M., Francini E., Lin, C.-L., Vessella, S., Wang, J.-N. (2017) Carleman estimate for second order elliptic equations with Lipschitz leading coefficients and jumps at an interface. JOURNAL DE MATHÉMATIQUES PURES ET APPLIQUÉES, vol. 108, pp. 163-206.

[9]   Alessandrini G., Di Cristo M., Francini E., Vessella S. (2017) Stability for quantitative photoacoustic tomography with well chosen illuminations. ANNALI DI MATEMATICA PURA ED APPLICATA, vol. 196, pp. 395-406.

[10]   Beretta E., Francini E., Vessella S. (2017) Differentiability of the Dirichlet to Neumann map under movements of polygonal inclusions with an application to shape optimization. SIAM JOURNAL ON MATHEMATICAL ANALYSIS, vol. 49, pp. 756-776.

[11]   Beretta E., Francini E. (2016) Asymptotic formulas for steady state voltage potentials in the presence of thin inhomogeneities. The complex case. RENDICONTI DELL'ISTITUTO DI MATEMATICA DELL'UNIVERSITÀ DI TRIESTE, vol. 48, pp. 209-219.

[12]   Francini E., Lin, C.-L., Vessella, S., Wang, J.-N. (2016) Three-region inequalities for the second order elliptic equation with discontinuous coefficients and size estimate. JOURNAL OF DIFFERENTIAL EQUATIONS, vol. 261, pp. 5306-5323.

[13]   Beretta E., De Hoop M:V:, Francini E., Vessella S.(2015) Stable determination of polyhedral interfaces from boundary data for the Helmholtz equation. COMMUNICATIONS IN PARTIAL DIFFERENTIAL EQUATIONS, vol. 40, pp. 1365-1392.

[14]   Beretta E., Francini E., Morassi A., Rosset E., Vessella S.(2014) Lipschitz continuous dependence of piecewise constant Lamé coefficients from boundary data: the case of non flat interfaces. INVERSE PROBLEMS, vol. 30, pp. 1-18.

[15]   Beretta E., Francini E., Vessella S. (2014) Uniqueness and Lipschitz stability for the identification of Lamé parameters from boundary measurements. INVERSE PROBLEMS AND IMAGING, vol. 8, pp. 611-644.

[16]   Beretta E., Francini E., Vessella S. (2014) Size estimates for the EIT problem with one measurement: The complex case.. REVISTA MATEMATICA IBEROAMERICANA, vol. 30, pp. 551-580.

[17]   Beretta E., Bonnetier E., Francini E., Mazzucato A.L. (2012) Small volume asymptotics for anisotropic elastic inclusions. INVERSE PROBLEMS AND IMAGING, vol. 6, pp. 1-23.

[18]   Beretta E., Francini E. (2011) Lipschitz stability for the electrical impedance tomography problem: the complex case.. COMMUNICATIONS IN PARTIAL DIFFERENTIAL EQUATIONS, vol. 36, pp. 1723-1749.

[19]   Beretta E., Francini E., Kim E., Lee J. (2010) Algorithm for the determination of a linear crack in an elastic body from boundary measurements.. INVERSE PROBLEMS, vol. 26, 085015.

[20]   Ammari H., Beretta E., Francini E., Kang H., Lim M. (2010) Optimization algorithm for reconstructing interface changes of a conductivity inclusion from modal measurements. MATHEMATICS OF COMPUTATION, vol. 79, pp. 1757-1777.

[21]   Ammari H., Beretta E., Francini E., Kang H., Lim M. (2010) Reconstruction of small interface changes of an inclusion from modal measurements II: The elastic case.. JOURNAL DE MATHÉMATIQUES PURES ET APPLIQUÉES, vol. 94, pp. 322-339.

[22]   Beretta E., CapdeboscqY., De Gournay F., Francini E. (2009) Thin cylindrical conductivity inclusions in a three-dimensional domain: polarization tensor and unique determination from boundary data. INVERSE PROBLEMS, vol. 25, 065004.

[23]   Beretta E., Francini E., Vessella S. (2008) Determination of a linear crack in an elastic body from boundary measurements - Lipschitz Stability. SIAM JOURNAL ON MATHEMATICAL ANALYSIS, vol. 40, pp. 984-1002.

[24]   Beretta E., Francini E. (2006) An asymptotic formula for the displacement field in the presence of thin elastic inhomogeneities. SIAM JOURNAL ON MATHEMATICAL ANALYSIS, vol. 38, pp. 1249-1261.

[25]   Francini E., Hoft T., Santosa F. (2006) An inverse problem in nondestructive evaluation of spot-welds. INVERSE PROBLEMS, vol. 22, pp. 645-661.

[26]   Ammari H., Beretta E., Francini E. (2006) Reconstruction of thin conductivity imperfections, II. The case of multiple segments. APPLICABLE ANALYSIS, vol. 85, pp. 87-105.

[27]   Beretta E., Francini E. (2005) Thin inclusions in an elastic body. LE MATEMATICHE, vol. 60, pp. 385-388.

[28]   Ammari H., Beretta E., Francini E. (2004) Reconstruction of thin conductivity imperfections. APPLICABLE ANALYSIS, vol. 83, pp. 63-76.

[29]   Beretta E., Francini E. (2003) Asymptotic formulas for perturbations in the electromagnetic fields due to the presence of thin inhomogeneities. In: Inverse Problems: Theory and Applications, American Mathematical Society, vol. 333, pp. 49-62.

[30]   Beretta E., Francini E., Vogelius M. (2003) Asymptotic formulas for steady state voltage potentials in the presence of thin inhomogeneities. A rigorous error analysis. JOURNAL DE MATHÉMATIQUES PURES ET APPLIQUÉES, vol. 82 (10), pp. 1277-1301.

[31]   Colesanti A., Francini E., Salani P., (2000) Convexity and asymptotic estimates for large solutions of Hessian equations. DIFFERENTIAL AND INTEGRAL EQUATIONS, vol. 13 N. 10-12, pp. 1459-1472.

[32]   Francini E. (2000) Stability results for a linear parabolic noncharacteristic Cauchy problem. JOURNAL OF INVERSE AND ILL-POSED PROBLEMS, vol. 8, pp. 255-272.

[33]   Francini E. (2000) Recovering a complex coefficient in a planar domain from the Dirichlet-to-Neumann map. INVERSE PROBLEMS, vol. 8 (3), pp. 255-272.

[34]   Kamynin V., Francini E. (1999) Asymptotic behavior of solutions of some inverse problems for higher order parabolic equations. RUSSIAN JOURNAL OF MATHEMATICAL PHYSICS, vol. 6 n.4, pp. 394-408.

[35]   Kamynin V., Francini E. (1998). An inverse problem for higher order parabolic equation. MATHEMATICAL NOTES, vol. 64 n.5, pp. 590-599.

[36]   Francini E., Greco A. (1998) Blow-up in exterior domains: existence and star-shapedness. ZEITSCHRIFT FUR ANALYSIS UND IHRE ANWENDUNGEN, vol. 17, pp. 431-441.

[37]   Francini E (1998) Starshapedness of level sets for solutions of nonlinear elliptic equations. MATHEMATISCHE NACHRICHTEN, vol. 193, pp. 49-56.

[38]   Kamynin V., Francini E., Saroldi M. (1998) Inverse Problems for Higher Order Parabolic Equations. RUSSIAN MATHEMATICAL SURVEYS, vol. 53 (4), pp. 202-203.

[39]   Francini E.(1996). Starshapedness of level sets for solutions of nonlinear parabolic equations. RENDICONTI DELL'ISTITUTO DI MATEMATICA DELL'UNIVERSITÀ DI TRIESTE, vol. 28, pp. 49-62.

[40]   Francini E. (1995). Sul principio di massimo per l'angolo formato dal gradiente di soluzioni di equazioni ellittiche con una direzione fissata. BOLLETTINO DELL'UNIONE MATEMATICA ITALIANA. A, vol. (7) 9-A, pp. 123-130, ISSN:0392-4033

Recent invited talks

2019 Chemnitz Symposuim on Inverse Problems, Frankfurt. Title: "Stable determination of polygonal and polyhedral interfaces from boundary measurements"

2019 Workshop "Reconstruction Methods for Inverse Problems" at BIRS, Banff, Canada. Title: "Stable determination of polygonal and polyhedral interfaces from boundary measurements"

2018 Internazional Workshop "Inverse Problems in the Alps II", Obergurgl, Austria. Title:"A transmission problem on a polygonal partition"

2017 5th Italian-Japanese Workshop on Geometric Properties for Parabolic and Elliptic PDE's, Osaka, Japan. Title: "Lipschitz stability in some inverse problems".

2017 Talk in NYU Abu Dhabi. Title: "Stable reconstruction of coefficients in elliptic equations from knowledge of their solutions"

2014 First Joint International Meeting RSME-SCM-SEMA-SIMAI-UMI, Bilbao, Spain. Title: "On the determination of finitely many parameters in some elliptic equations and systems from boundary measurements"

2014 10th AIMS Conference on Dynamical Systems, Differential Equations and Applications", Madrid, Spain. Title: "Stable determination of interfaces using boundary measurements".

2012 PICOF'12 Inverse Problems, Control and Shape Optimization 6th International Conference, Ecole Polytechnique, Palaiseau. Title: "On the inverse conductivity problem with complex coefficient" (Plenary speaker)

2011 Applied Inverse Problems Conference 2011, College Station, Texas. Title: "Detection of thin inclusions in linear elasticity" (Plenary speaker)

2011 Inverse Problems in Analysis and Geometry, Isaac Newton Institute, Cambridge, GB. Title: "Some issues on the inverse conductivity problem with a complex coefficient"

2008 Workshop on Imaging Microstructures: Mathematical and Computational Challenges, Institute Henri Poincaré, Paris, France.

Conference organization

2002, 2006 Minicourse on Applied Inverse Problems, Firenze, Italy.

2017 International conference "Geometric aspects of PDES", Firenze, Italy.

2018 INdAM Workshop "Reconstruction Methods for Inverse Problems", Roma, Italy.

Firenze, July 14th, 2020

Elise Francini