

Afonso Paiva

Associate Professor, ICMC-USP

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Research Interests

My research comprises many topics of Computer Graphics, Visualization, Image Processing, Computational Fluid Dynamics, and Data Science. In particular, my current interests are:

- Meshless Methods in Computer Animation;
- Interval Methods in Graphics and CFD;
- Kernel Methods in Information Visualization.

Education

- 2001–2003 **PhD Applied Mathematics**, Pontifical Catholic University of Rio de Janeiro, Rio de Janeiro, RJ, Brazil.
- 2001–2003 **MSc Mathematics**, National Institute for Pure and Applied Mathematics, Rio de Janeiro, RJ, Brazil.
- 1996–2000 **BSc Mathematics**, Federal University of Uberlândia, Uberlândia, MG, Brazil.

Professional Experience

- 2018–∞ **Associate Professor**, ICMC, University of São Paulo, São Carlos, SP, Brazil.
- 2010–2018 **Assistant Professor**, ICMC, University of São Paulo, São Carlos, SP, Brazil.
- 2009–2010 **Assistant Professor**, Federal University of Uberlândia, Uberlândia, MG, Brazil.

Publications

- 2022 **Counting Particles: a simple and fast surface reconstruction method for particle-based fluids**, *Proceedings of SIBGRAPI 2022*.
F. I. Quispe and A. Paiva
- 2022 **Region reconstruction with the sphere-of-influence diagram**, *Computers & Graphics (SIBGRAPI 2022)*, 107.
L. H. de Figueiredo and A. Paiva
- 2022 **Narrow-band screen-space fluid rendering**, *Computer Graphics Forum*, 41(6).
F. Oliveira and A. Paiva
- 2021 **STFT-LDA: An algorithm to facilitate the visual analysis of building seismic responses**, *Information Visualization*, 20(4).
Z. Zhao, D. Motta, M. Berger, J. A. Levine, I. B. Kuzucu, R. B. Fleischman, A. Paiva and C. Scheidegger
- 2021 **On novelty detection for multi-class classification using non-linear metric learning**, *Expert Systems with Applications*, 167.
S. R. Silva, T. Vieira, D. Martínez and A. Paiva
- 2021 **CrimAnalyzer: understanding crime patterns in São Paulo City**, *IEEE Transactions on Visualization and Computer Graphics*, 27(4).
G. Garcia, J. Silveira, J. Poco, A. Paiva, M. Nery, C. T. Silva, S. Adorno and L. G. Nonato

- 2020 **RBF Liquids: an adaptive PIC solver using RBF-FD**,
ACM Transactions on Graphics (SIGGRAPH Asia 2020), 39(6).
R. Nakanishi, F. Nascimento, R. Campos, P. Pagliosa and A. Paiva
- 2020 **Simple and reliable boundary detection for meshfree particle methods using interval analysis**,
Journal of Computational Physics, 420.
M. Sandim, A. Paiva and L. H. de Figueiredo
- 2019 **Boundary particle resampling for surface reconstruction in liquid animation**,
Computers & Graphics (SIBGRAPI 2019), 84.
M. Sandim, N. Oe, D. Cedrim, P. Pagliosa and A. Paiva
- 2019 **Vessel optimal transport for automated alignment of retinal fundus images**,
IEEE Transactions on Image Processing, 28(12).
D. Motta, W. Casaca, and A. Paiva
- 2018 **Fundus image transformation revisited: towards determining more accurate registrations**,
Proceedings of IEEE CBMS 2018.
D. Motta, W. Casaca, and A. Paiva
- 2018 **A user-friendly interactive framework for unsteady fluid flow segmentation and visualization**,
Journal of Visualization, 21(4).
D. Motta, W. Casaca, P. Pagliosa and A. Paiva
- 2017 **Least-squares morphing of dynamic meshes**,
Proceedings of SIBGRAPI 2017.
A. Medalha, L. Pagliosa, A. Paiva and P. Pagliosa
- 2016 **Boundary detection in particle-based fluids**,
Computer Graphics Forum (Eurographics 2016), 35(2).
M. Sandim, D. Cedrim, L. G. Nonato, P. Pagliosa and A. Paiva
- 2016 **Depth functions as a quality measure and for steering multidimensional projections**,
Computers & Graphics (SIBGRAPI 2016), 60.
D. Cedrim, V. Vad, A. Paiva, E. Gröller, L. G. Nonato and A. Castelo
- 2016 **Visualizing and interacting with kernelized data**,
IEEE Transactions on Visualization and Computer Graphics, 22(3).
A. Barbosa, F. Paulovich, A. Paiva, S. Goldenstein, F. Petronetto and L. G. Nonato
- 2016 **Partial similarity of 3D shapes using cross recurrence plot**,
Proceedings of SIBGRAPI 2016.
R. Nakanishi, J. P. Ono, P. Pagliosa, L. G. Nonato and A. Paiva
- 2015 **Particle-based fluids for viscous jet buckling**,
Computers & Graphics, 52.
L.F.S. Andrade, M. Sandim, F. Petronetto, P. Pagliosa and A. Paiva
- 2015 **Concentric Radviz: visual exploration of multi-task classification**,
Proceedings of SIBGRAPI 2015.
J. P. Ono, F. Sikansi, D. C. Correa, F. Paulovich, A. Paiva and L. G. Nonato
- 2015 **Exploratory segmentation of vector fields using multidimensional projection**,
Proceedings of SIBGRAPI 2015.
D. Motta, M. L. Oliveira, P. Pagliosa, L. G. Nonato and A. Paiva
- 2015 **SHREC'15 Track: Non-rigid 3D Shape Retrieval**,
Proceedings of EG Workshop on 3D Object Retrieval (3DOR).
R. Nakanishi, A. Paiva, L. G. Nonato, et al.
- 2015 **All-in-focus imaging technique used to improve 3d retinal fundus image reconstruction**,
Proceedings of ACM SAC 2015.
D. Motta, L. Matos, A. C. Souza, R. Marcato, A. Paiva and L. A. V. Carvalho

- 2014 **SPH fluids for viscous jet buckling**,
Proceedings of SIBGRAPI 2014.
L.F.S. Andrade, M. Sandim, F. Petronetto, P. Pagliosa and A. Paiva
- 2014 **Approximating implicit curves on plane and surface triangulations with affine arithmetic**,
Computers & Graphics, 40.
F. Nascimento, A. Paiva, L. H. de Figueiredo and J. Stolfi
- 2013 **MIST: multiscale information and summaries of texts**,
Proceedings of SIBGRAPI 2013.
P. Pagliosa, R. M. Martins, D. Cedrim, A. Paiva, R. Minghim and L. G. Nonato
- 2013 **Normal correction towards smoothing point-based surfaces**,
Proceedings of SIBGRAPI 2013.
P. Valdivia, D. Cedrim, F. Petronetto, A. Paiva and L. G. Nonato
- 2013 **Mesh-free discrete Laplace-Beltrami operator**,
Computer Graphics Forum, 32(6).
F. Petronetto, A. Paiva, E. S. Helou, D. E. Stewart and L. G. Nonato
- 2013 **Spectral image segmentation using image decomposition and inner product-based metric**,
Journal of Mathematical Imaging and Vision, 45(3).
W. Casaca, A. Paiva, E. G. Nieto, P. Joia and L. G. Nonato
- 2012 **Approximating implicit curves on triangulations with affine arithmetic**,
Proceedings of SIBGRAPI 2012.
F. Nascimento, A. Paiva, L. H. de Figueiredo and J. Stolfi
- 2012 **Colorization by multidimensional projection**,
Proceedings of SIBGRAPI 2012.
W. Casaca, E. G. Nieto, C. Ferreira, G. Tavares, P. Pagliosa, F. Paulovich L. G. Nonato and A. Paiva
- 2012 **Class-specific metrics for multidimensional data projection applied to CBIR**,
The Visual Computer, 28(10).
P. Joia, E. G. Nieto, J. B. Neto, W. Casaca, G. Botelho, A. Paiva and L. G. Nonato
- 2011 **Sketch-based adaptive mesh augmentation using stellar operators**,
Proceedings of SIBGRAPI 2011.
A. Paiva, R. Amorim, L. Velho and M. C. Sousa
- 2011 **Spectral segmentation using cartoon-texture decomposition and inner product-based metric**,
Proceedings of SIBGRAPI 2011.
W. Casaca, A. Paiva and L. G. Nonato
- 2011 **Projection-based image retrieval using class-specific metrics**,
Proceedings of SIBGRAPI 2011.
P. Joia, E. G. Nieto, G. Botelho, J. B. Neto, A. Paiva and L. G. Nonato
- 2010 **Meshless Helmholtz-Hodge decomposition**,
IEEE Transactions on Visualization and Computer Graphics, 16(2).
F. Petronetto, A. Paiva, M. Lage, G. Tavares, H. Lopes and T. Lewiner
- 2009 **Fluid-based hatching for tone mapping in line illustrations**,
The Visual Computer (CGI 2009), 25(5-7).
A. Paiva, E. V. Brazil, F. Petronetto and M. C. Sousa
- 2009 **Particle-based viscoplastic fluid/solid simulation**,
Computer-Aided Design, 41(4).
A. Paiva, F. Petronetto, T. Lewiner and G. Tavares
- 2006 **Robust adaptive meshes for implicit surfaces**,
Proceedings of SIBGRAPI 2006.
A. Paiva, H. Lopes, T. Lewiner and L.H. de Figueiredo

- 2006 **Vector field reconstruction from sparse samples with applications**, *Proceedings of SIBGRAPI 2006*.
M. Lage, F. Petronetto, A. Paiva, H. Lopes, T. Lewiner and G. Tavares
- 2006 **Particle-based non-Newtonian fluid animation for melting objects**, *Proceedings of SIBGRAPI 2006*.
A. Paiva, F. Petronetto, T. Lewiner and G. Tavares
- 2006 **Robust visualization of strange attractors using affine arithmetic**, *Computers & Graphics*, 30(6).
A. Paiva, L.H. de Figueiredo and J. Stolfi

Awards

- 2022 **Honorable Mention**, *SIBGRAPI 2022*, “Counting Particles: a simple and fast surface reconstruction method for particle-based fluids”.
- 2017 **Best Paper Award**, *SIBGRAPI 2017*, “Least-squares morphing of dynamic meshes”.
- 2015 **Honorable Mention**, *SIBGRAPI 2015*, “Concentric Radviz: visual exploration of multi-task classification”.
- 2014 **Best Paper Award**, *SIBGRAPI 2014*, “SPH fluids for viscous jet buckling”.
- 2011 **Best Paper Award**, *SIBGRAPI 2011*, “Spectral segmentation using cartoon-texture decomposition and inner product-based metric”.
- 2011 **Best Paper Award**, *SIBGRAPI 2011*, “Projection-based image retrieval using class-specific metrics”.

Research Grants – PI only

- 2020–2022 **Meshfree methods based on generalized finite differences using MLS and SPH**, *São Paulo State Funding Agency – FAPESP Regular Project #2019/23215-9*.
- 2014–2016 **Applications of SPH in Geometry Processing and Fluid Flow Animation**, *São Paulo State Funding Agency – FAPESP Regular Project #2014/09546-9*.

Teaching – last 5 years

Graduate	SME5859 – Physically-based Animation (2018)	ICMC-USP
Graduate	SME5827 – Mesh Generation (2019)	ICMC-USP
Graduate	MAI5015 – Scientific Visualization (2018–2021)	ICMC-USP
Graduate	MAI5017 – Information Visualization (2018–2021)	ICMC-USP
Undergraduate	SME0104, SME0300 – Numerical Calculus (2016,2017,2019,2020)	ICMC-USP
Undergraduate	SME0332 – Introduction to Python Programming (2017–2021)	ICMC-USP
Undergraduate	SME0271 – Geometric Modeling (2017)	ICMC-USP
Undergraduate	SME0302 – Numerical Methods for Engineers II (2016,2019)	ICMC-USP

Supervised Students – concluded

Postdoc	Douglas Cedrim Oliveira , 2017	ICMC-USP
PhD	Rafael Umino Nakanishi , 2021	ICMC-USP
PhD	Marcos Henrique Alves Sandim , 2020	ICMC-USP
PhD	Danilo Andrade Motta , 2018	ICMC-USP
MSc	Felipe Orlandi de Oliveira , 2021	ICMC-USP
MSc	Nicolas Masanori Shimizu Oe , 2018	ICMC-USP
MSc	Luiz Otávio Toratti , 2018	ICMC-USP

MSc **Filipe de Carvalho Nascimento**, 2016
MSc **Rafael Umio Nakanishi**, 2016
MSc **Luiz Fernando de Souza Andrade**, 2014
MSc **Marcos Henrique Alves Sandim**, 2014

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Professional Service

Program Chair **SIBGRAPI 2021**

Conference Committee **SIBGRAPI** (2011-2022), **GRAPP/VISIGRAPP** (2019–2020)

Journal Reviwer **The Visual Computer** (2011,2013,2021), **Computers & Graphics** (2019–2021), **Computers & Fluids** (2019), **Computer Graphics Forum** (2015)