

## 4. SCIENTIFIC PRODUCTION

### 4.1. BOOKS

1. *GPU Ray Tracing in Non-Euclidean Spaces*,  
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2. *Intrinsic Visualization in the Thurston's Geometries*.  
33rd Brazilian Mathematical Colloquium, 2021.  
Tiago Novello, Vinicius da Silva and Luiz Velho.
3. *Proceedings of the Live Coding Music Seminar*.  
IMPA, 2019.  
Luiz Velho and Vitor Rolla.
4. *OBSERVATOR!O 2016 - Experiências em Deep Learning*  
IMPA / VISGRAF Lab, 2016  
Luiz Velho, Juliana Giannella.
5. *Um Olhar nos Espaço de Dimensão 3*  
IMPA / MAST, 2015  
Luiz Velho, Pierre Berger, Pierre-Yves Fave and Juliana Giannella.
6. *From Fourier Analysis to Wavelets*  
Springer Verlag, IMPA Monographs Series, 2015  
Luiz Velho, Jonas Gomes.
7. *Design and Implementation of 3D Graphics Systems*  
Taylor and Francis, 2012  
Luiz Velho, Jonas Gomes and Mario Costa Souza.
8. *Computer Graphics: Theory and Practice*  
Taylor and Francis, 2011  
Luiz Velho, Jonas Gomes and Mario Costa Souza.
9. *Métodos Matemáticos e Computacionais em Musica*  
XXXII CNMAC - Congresso Nacional de Matemática Aplicada e Computacional, 2009  
Luiz Velho, Marcelo Cicconet, Sergio Krakowski, Paulo César Carvalho.
10. *Compressive Sensing*  
27 Colóquio Brasileiro de Matemática, IMPA, 2009  
Luiz Velho, Adriana Schulz, Eduardo Silva.
11. *Image Processing for Computer Graphics and Vision*  
Springer Verlag, 2008  
Luiz Velho, Alejandro Frery and Jonas Gomes.
12. *Mathematical Optimization in Graphics and Vision*  
Morgan Kaufmann,, 2008  
Luiz Velho, Paulo Carvalho, Luiz Henrique Figueiredo, Jonas Gomes
13. *High Dynamic Range Image Reconstruction*  
Morgan and Claypool Publishers, 2008  
Luiz Velho, Asla Sa, Paulo Cezar Carvalho
14. *Fotografia 3D*  
25 Colóquio Brasileiro de Matemática, IMPA, 2005  
Luiz Velho, Paulo César Carvalho, Esdras Soares, Anselmo Montenegro, Asla Sá, Adelailson Peixoto e Luiz Rivera.
15. *Fundamentos da Computação Gráfica*  
IMPA, Serie Computação e Matemática, 2004  
Luiz Velho, Jonas Gomes.
16. *Métodos de Otimização em Computação Gráfica*  
Notas de Curso, IMCA 2003  
Luiz Velho, Paulo Cezar Carvalho.
17. *Mathematical Optimization Methods in Graphics and Vision*  
Course Notes, SIGGRAPH 2003  
Luiz Velho, Paulo Cezar Carvalho
18. *Tutorial on Mathematical Optimization in Graphics and Vision*  
SIGGRAPH Tutorial Notes, 2002  
Luiz Velho, Paulo Cezar Carvalho

19. *Implicit Objects for Computer Graphics*  
Springer Verlag, 2002  
Luiz Velho, Jonas Gomes e Luiz Henrique de Figueiredo
20. *Sistemas Gráficos 3D*  
IMPA - SBM, 2001  
Luiz Velho, Jonas Gomes
21. *Otimização e Aplicações em Computação Gráfica*  
XXII CNMAC - Congresso Nacional de Matemática Aplicada e Computacional, 2000  
Luiz Velho, Jonas Gomes, Paulo César Carvalho e Luiz Henrique Figueiredo
22. *Image Processing and Wavelets*  
First Latin American Congress of Mathematicians, UMACLA, 2000  
Luiz Velho, Jonas Gomes e Paulo César Carvalho
23. *Introdução aos Espaços de Escala*  
Escola de Computação 2000  
Luiz Velho, Ralph Teixeira e Jonas Gomes (colaborador)
24. *Métodos de Otimização e suas Aplicações em Computação Gráfica*  
22 Colóquio Brasileiro de Matemática, IMPA, 1999  
Luiz Velho, Jonas Gomes, Paulo César Carvalho e Luiz Henrique Figueiredo
25. *Computação Gráfica: Volume 1*  
IMPA - SBM, 1999  
Luiz Velho, Jonas Gomes
26. *From Fourier Analysis to Wavelets*  
Siggraph Course Notes, 1998 e 1999  
Luiz Velho, Jonas Gomes
27. *Warping and Morphing of Graphical Objects*  
Morgan Kaufmann, 1998  
Luiz Velho, Jonas Gomes, Bruno Costa, Lúcia Darsa
28. *Wavelets e Aplicações em Computação Gráfica*  
21 Colóquio Brasileiro de Matemática, IMPA, 1997  
Luiz Velho, Jonas Gomes e Siome Goldstein
29. *Image Processing for Computer Graphics*  
Springer Verlag, 1997  
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30. *Warping and Morphing of Graphical Objects*  
Siggraph Course Notes, 1995 e 1997  
Luiz Velho, Jonas Gomes, Bruno Costa, Lúcia Darsa, George Wolberg e John Berton
31. *Deformação e Metamorfose de Objetos Gráficos*  
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32. *Computação Gráfica: Imagem*  
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33. *Introdução à Computação Gráfica*  
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34. *Implicit Objects in Computer Graphics*  
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35. *Conceitos Básicos de Computação Gráfica*  
VII Escola de Computação, IME-USP, 1990  
Luiz Velho, Jonas Gomes

## 4.2. BOOK CHAPTERS

1. chapter 33 - *Real-Time Rendering of Complex Fractals*.  
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2. chapter *Video and Virtual Reality*.  
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3. *Visual Representations for Music Understanding Improvement*,  
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4. *Virtual Emotion to Expression: A Comprehensive Dynamic Emotion Model to Facial Expression Generation Using the MPEG-4 Standard*  
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5. *Togetherness: How Real is that Presence*  
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6. *Projective Texture Atlas and Applications*  
in Curves and Surfaces: Avignon 06, T. Lyche,, L. Schumaker, (editors), Nashboro Press, Brentwood, 2007  
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7. *Point Cloud Denoising*  
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8. *Adaptive Mesh Extraction using Simplification and Refinement*  
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10. *Generalizing the C4 Four-directional Box Spline to Surfaces of Arbitrary Topology*  
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12. *Computa  o Gr fica: Uma Proposta de Plano Pedag gico*  
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13. *Graphical Objects*  
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15. *Algorithmic Modeling*  
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## 4.3. ARTICLES IN SCIENTIFIC JOURNALS

1. *How to see the eight Thurston geometries*  
Ensaios Matem ticos, SBM, 2021.  
Tiago Novello, Vinicius da Silva, Mikhail Belolipetsky and Luiz Velho.
2. *Interdisciplinaridade, colabora  o e imers o: o design de uma experi ncia em realidade virtual com o objetivo de preserva  o da mem ria*  
Revista Museologia e Interdisciplinaridade, Revista Museologia e Interdisciplinaridade , 2021.  
Andrea Lennhoff , Luiza Novaes and Luiz Velho.
3. *Predicting Dengue Outbreaks in Brazil with Manifold Learning on Climate Data*.  
Expert Systems With Applications, 2021.  
Caio Souza, Pedro Maia, Lucas Stolerma n, Vitor Rolla and Luiz Velho.

4. *A Simple and Complete Discrete Exterior Calculus on General Polygonal Meshes.*  
Computer Aided Geometric Design, 2021.  
Lenka Ptackova and Luiz Velho.
5. *Data Visualization in the Time of Coronavirus.*  
SDRJ - Strategic Design Research Journal, 2, 2021.  
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Julia Giannella and Luiz Velho.
6. *Self-similarity of Classical Music Networks.*  
Fractals, 2020.  
Vitor Rolla, Pablo Riera, Pedro Souza, Luiz Velho, and Jorge Zubelli.
7. *Global Illumination of Non-Euclidean Spaces.*  
Computers and Graphics, SIBGRAPI Special Edition, 2020.  
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8. *Visualization of Nil, Sol, and  $SL_2(\mathbb{R})$  Geometries.*  
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9. *Experiments in Situated Participatory Virtual Reality.*  
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Luiz Velho, Djalma Lucio, and Leo Carvalho.
10. *TensorPose: Real-time pose estimation for interactive applications.*  
Computers and Graphics, 2019.  
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11. *Visualizacao de Colecao de Imagens.*  
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12. *VR Tour: Guided Participatory Meta-Narrative for Virtual Reality Exploration.*  
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13. *The complexity of classical music networks,*  
Europhysics Letters, 2018,  
Luiz Velho, Vitor Rolla, Juliano Kestenberg.
14. *Hough Transform for Real-Time Plane Detection in Depth Images,*  
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Luiz Velho, Eduardo Vera Sousa, Djalma Lucio, Leandro Fernandes
15. *Local Moebius Transformations Applied to Omnidirectional Images.*  
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16. *Automatic reconstruction of ancient Portuguese tile panels*  
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17. *Sketch-Based Modeling and Adaptive Meshes*  
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Luiz Velho, Emilio Brazil, Ronan Amorim, Mario Costa Souza and Luiz Henrique Figueiredo
18. *Real-time Correction of Panoramic Images using Hyperbolic Moebius Transformations*  
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19. *Facing the High-dimensions: Inverse Projection Luiz Velho, Radial Basis Functions*  
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20. *ChoreoGraphics: An Authoring Tool for Dance Shows*  
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21. *An image-space algorithm for immersive views in 3-manifolds and orbifolds*  
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22. *Adaptive multi-chart and multiresolution mesh representation*  
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23. *Efficient 3D object recognition using foveated point clouds*  
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24. *Virtual Table-Teleporter: Image Processing and Rendering for Horizontal Stereoscopic Display*  
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25. *Conic-like subdivision curves on surfaces*  
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31. *Hermite Radial Basis Functions Implicits*  
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32. *Subdivision de courbes sur les surfaces avec controle de la longueur d'arc*  
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Luiz Velho, Jorge Estrada-Sarlabous, Victoria Hernandez, Dimas Morera
33. *On 2D Solid Alpha-Complexes of Poisson Disc Samplings*  
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34. *Topological Mesh Operators*  
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35. *3D Face Computational Photography Using PCA Spaces.*  
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Computers and Graphics, 2009.  
Luiz Velho, Marcelo Siqueira, Dianna Xu, Jean Gallier, Luis Gustavo Nonato, Dimas Martinez Morera.
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Luiz Velho, Fabiano Romeiro, Luiz Henrique de Figueiredo
40. *Modeling on Triangulations Luiz Velho, Geodesic Curves*  
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Luiz Velho, Fernando de Goes, Siome Goldenstein

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#### 4.4. TECHNICAL PAPERS IN CONFERENCE PROCEEDINGS

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*Piecewise Description of Implicit Surfaces and Solids*,  
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supervisor: Demetri Terzopoulos

*SCRIPTS: On the Description of Computer Animated Images*,  
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supervisor: David Zeltzer

#### 4.8. THESIS SUPERVISION

1. Thales Magalhães  
*NeRF Rendering*  
Dissertação de Mestrado, IMPA, ongoing
2. Hallison da Paz  
*AI Graphics*  
Tese de Doutorado, IMPA, ongoing
3. Caio Souza  
*Intelligent Agents*  
Tese de Doutorado, IMPA, ongoing
4. Luiz Schirmer  
*Pose Detection and Tracking*  
Tese de Doutorado, PUC-Rio, 2021

5. Andrea Lennhoff  
*Museums and Media*  
Tese de Doutorado, PUC-Rio, 2021
6. Julia Giannella  
*Visualization*  
Tese de Doutorado, ESDI-UERJ, 2020
7. Bruno Madeira  
*Métodos de Visão Computacional e Processamento de Imagens para Estereoscopia Horizontal*  
Tese de Doutorado, IMPA, 2017
8. Lenka Ptackova  
*A Discrete Wedge Product on Polygonal Pseudomanifolds*  
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9. Hallison da Paz  
*Reconstrução Adaptativa De Superfícies Implícitas A Partir De Imagens De Profundidade*  
Dissertação de Mestrado, IMPA, 2017,
10. Eduardo Vera Sousa  
*Panoramas em Camadas*  
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11. Aldo Zang  
*Panoramas omnidirecionais expandidos*  
Tese de Doutorado, IMPA, 2016
12. Hallison da Paz  
*Panoramas em Camadas*  
Trabalho de Conclusão, IME, 2014, co-orientador Paulo Rosa
13. Juliano Kestenberg  
*Fotografia e interação no Jardim Botânico: uma abordagem do design de participação em contexto museológico*  
Dissertação de Mestrado, ESDI, 2014, co-orientador Washington Lessa.
14. Barbara Pires e Castro  
*Corpo e Mídia: a experiência artística em um intervalo*  
Dissertação de Mestrado, UFRJ, 2013, co-orientador Doris Kosminsky.
15. David da Silva Pires  
*Estimação de movimento a partir de imagens RGBD usando homomorfismo entre grafos*  
Tese de Doutorado, USP, 2012, co-orientador Roberto Cesar Jr.
16. Dália Bonila  
*Simulação de Fluidos*  
Tese de Doutorado, IMPA, 2011
17. Adriana Schulz  
*ChoreoGraphics: An Authoring Environment for Dance Shows*  
Dissertação de Mestrado, IMPA, 2011
18. Leandro Cruz  
*Modelagem de Terrenos*  
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19. Alexandra Camargo Alves  
*Sistemas de autoria para produção de animações por crianças utilizando Interfaces naturais*  
Tese de Doutorado, USP, 2011, co-orientadora Roseli Lopes
20. Alexandre Chapiro  
*Improving Mobile Videos*  
Dissertação de Mestrado, IMPA, 2011, co-orientador Paulo Cezar Carvalho
21. Ives Macedo Junior  
*HRBF Implicits*  
Tese de Doutorado, IMPA, 2011
22. Thales Vieira  
*Galerias Inteligentes e Otimização de Posicionamento de Câmera*  
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23. Anderson Mayrink  
*Learning Head Movements*  
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24. Sergio Krakowski  
*Rhythm-Controlled Automata Applied to Musical Improvisation*  
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25. Aldo Rene Zang  
*Esquema Híbrido para Amostragem de Mapas de Iluminação em Renderizações Foto-Realista*  
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26. Esdras Medeiros  
*Topologia Solida*  
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27. Adriana Schulz  
*Compressive Sensing*  
Trabalho de Conclusão, UFRJ, 2008, co-orientador Eduardo Silva
28. João Velho  
*Motion Graphics*  
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29. Ives Macedo Junior  
*Animação e Simulação de Fluidos*  
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30. Paula Salgado Lucena  
*Animação Facial*  
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31. Dimas Martinez Morera  
*Geodésicas em Superfícies Discretas*  
Tese de Doutorado, IMPA, 2006, co-orientador Paulo Cezar Carvalho
32. Luiz Antonio Rivera  
*Animação Baseada em Física Luiz Velho, Modelos Geométricos em Multi-Resolução*  
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33. Vinícius Melo  
*Estruturas de Dados Volumétricas*  
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34. Bruno Madeira  
*Match Move*  
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35. Jonas Sossai Jr.  
*Atlas Variacionais usando Mapeamentos Projetivos*  
Dissertação de Mestrado, IMPA 2006
36. Marcus Aurelius Cordenunsi Farias  
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Dissertação de Mestrado, UFRGS, 2006, co-orientador João Comba
37. Sueni de Souza Arouca  
*Método implícito para reconstrução de curvas a partir de pontos esparsos*  
Dissertação de Mestrado, PUC-Rio, 2006, co-orientador Helio Lopes
38. Fabiano Segadaes Romeiro  
*Hardware-assisted rendering of CSG models*  
Dissertação de Mestrado, IMPA, 2006, co-orientador Luiz Henrique de Figueiredo
39. Hedlana Bezerra  
*Colorização 3D para Animação 2D*  
Dissertação de Mestrado, PUC-Rio, 2005, co-orientador Bruno Feijó
40. Aruquia Peixoto  
*Simplificação de Superfícies Implícitas Não-Compactas Luiz Velho, Preservação de Topologia*  
Dissertação de Mestrado, COPPE - UFRJ, 2005, co-orientador Ricardo Farias
41. Moacyr Barbosa da Silva  
*Eixos Mediais*  
Tese de Doutorado, IMPA, 2005, co-orientador Ralph Teixeira
42. Lourena Rocha  
*Interpolação de Movimento Baseada em Momentos*  
Dissertação de Mestrado, IMPA, 2004, co-orientador Paulo Cezar Carvalho

43. José Luiz Soares Luz  
*Visualização de Superfícies usando Pontos*  
Dissertação de Mestrado, IMPA, 2004, co-orientador Paulo Cezar Carvalho
44. Antônio Apolinário  
*Representação Hierárquica de Funções de Distância*  
Tese de Doutorado, COPPE - UFRJ 2004, co-orientador Cláudio Esperança
45. Boris Medeiros Madrazo  
*Visualização de Superfícies Implícitas*  
Tese de Doutorado, IMPA 2004, co-orientador Luiz Henrique de Figueiredo
46. Heloisa Reis Leal  
*Operações CSG Luiz Velho, Representações de Pontos*  
Dissertação de Mestrado, PUC-Rio, 2004, co-orientador Waldemar Celes
47. Sergio Estevão Machado Lisboa Pinheiro  
*Um sistema de cache preditivo para o processamento em tempo-real de grandes volumes de dados gráficos*  
Tese de Doutorado, PUC-Rio, 2004, co-orientador Waldemar Celes
48. Aldo Nogueira e Elaine Prata  
*Modelagem e Visualização Baseada em Imagens*  
Iniciação Científica, UERJ, 2003
49. Marcelo Medeiros Carneiro  
*Interfaces Assistidas para Cegos usando Dispositivos Reativos e Transformadas de Distância*  
Tese de Doutorado, PUC-Rio, 2002, co-orientador Marcelo Gattass
50. Esdras Soares de Medeiros  
*Fotografia 3D*  
Dissertação de Mestrado, IMPA, 2002
51. Adailson Peixoto  
*Extração de Malhas em Multiresolução*  
Tese de Doutorado, PUC-Rio, 2002, co-orientador Marcelo Gattass
52. Regis Destobbeleire  
*Super-Resolution*  
Stage d'Option Scientifique, Ecole Polytechnique, 2002
53. Paula Salgado Lucena  
*Animação Facial*  
Dissertação de Mestrado, PUC-Rio, 2002, co-orientador Marcelo Gattass
54. Paul Billault  
*Texture Synthesis Algorithms*  
Stage d'Option Scientifique, Ecole Polytechnique, 2001
55. Bruno Madeira  
*Target Tracking*  
Trabalho de Conclusão, IME, 2001
56. Anselmo de Paiva  
*Compressão de Dados Volumétricos Baseada na Transformada do Cosseno Local*  
Tese de Doutorado, Departamento de Informática, PUC-Rio, 2001, co-orientador Marcelo Gattass
57. Anderson Mayrink  
*Espaços de Escala e Detecção de Arestas*  
Dissertação de Mestrado, Visgraf / IMPA, 2000
58. Rodrigo Toledo  
*Visualização de Terrenos em Multiresolução*  
Dissertação de Mestrado, Departamento de Informática, PUC-Rio, 2000, co-orientador Marcelo Gattass
59. Kenneth B. Russell,  
*IMPS: Implicit Surfaces for Interactive Animated Character*  
MS Thesis Reader, MIT-Media Lab, May de 1999
60. Andre de Machado Matos  
*Panoramas Virtuais*  
Dissertação de Mestrado, Departamento de Informática, PUC-Rio, 1998, co-orientador Marcelo Gattass
61. Fernando Wagner da Silva  
*Um Sistema de Animação Luiz Velho, Movimento Capturado*  
Dissertação de Mestrado, Departamento de Informática, UFRJ, 1998.

#### 4.9. POST-DOC SUPERVISION

Gulherme Schardong, 2020 -

Santiago Guisasola, 2019 -

Tiago Novello, 2019 -

Lenka Ptackova, 2017-2018

Aldo Zang, 2016.

Vitor Rolla, 2015-2017.

Leandro Cruz, 2015-2016.

Fernanda Andaló, 2013-2014.

Luiz Penaranda, 2012-2014.

Erwan Reanlt, 2010-2012.

André Maximo, 2010-2012

Noslen Hernandez, 2012.

Marcelo Cicconet, 2011.

Anderson Mayrink, 2009-2010.

#### 4.10. SCIENTIFIC DIVULGATION

1. *A Matemática da Animação por Computador*,  
in *Ciencia Hoje*, SBPC, 2013  
Luiz Velho, Luiz Henrique Figueiredo e Diego Nehab
2. “Matemática e o Desenvolvimento de Software”  
2004, Luiz Velho, Jonas Gomes e César Camacho
3. “Visorama: Arte e Matemática”  
Ciclo Arte, Ciência e Tecnologia  
ITAU Cultural, 2003
4. “Sobre o IMPA ”  
in *IMPA 50 anos*, 2003
5. “Computação Gráfica e Estilos Visuais” (November, 2000)  
Revista Eletrônica Idéias, Escola de Artes Visuais  
Luiz Velho, Jonas Gomes
6. “Descrição do Movimento na Era da Informatização ”  
in *Nota-Anna*, Analivia Cordeiro, Editora Fapesp, 1997
7. “Vislumbrando o Futuro das Comunicações: a Internet” (November, 1995)  
Journal of the Society of Television Engineers  
Luiz Velho, Jonas Gomes
8. “Novas Tecnologias de Video” (December, 1994)  
*Computação Gráfica*, Journal of the Society of Television Engineers  
Luiz Velho, Jonas Gomes
9. “Composição de imagens” (May, 1994)  
*Computação Gráfica*, Journal of the Society of Television Engineers  
Luiz Velho, Jonas Gomes
10. “Vídeo Digital” (March, 1993)  
*Computação Gráfica*, Journal of the Society of Television Engineers  
Luiz Velho, Jonas Gomes
11. “Padrões de Cor” (December, 1992)  
*Computação Gráfica*, Journal of the Society of Television Engineers  
Luiz Velho, Jonas Gomes
12. “Fundamentos de Cor” (September 1992)  
*Computação Gráfica*, Journal of the Society of Television Engineers  
Luiz Velho, Jonas Gomes
13. “Imagem Digital” (June, 1992)  
*Computação Gráfica*, Journal of the Society of Television Engineers  
Luiz Velho, Jonas Gomes

14. “Computação Gráfica” (March, 1992)  
*Computação Gráfica*, Journal of the Society of Television Engineers  
Luiz Velho, Jonas Gomes
15. *Computação Gráfica*,  
in *Ciencia Hoje*, Vol. 10, No. 56, pages 36-47, SBPC, August 1989  
Luiz Velho, Jonas Gomes