

References

1. L. Armijo, Minimization of functions having Lipschitz continuous first partial derivatives. *Pac. J. Math.* **16**(1), 1–3 (1966)
2. V. Arsigny, O. Commowick, N. Ayache, X. Pennec, A fast and Log-Euclidean polyaffine framework for locally linear registration. *J. Math. Imaging Vis.* **33**(2), 222–238 (2009)
3. V. Arsigny, P. Fillard, X. Pennec, N. Ayache, Fast and simple calculus on tensors in the Log-Euclidean framework, in *Medical Image Computing and Computer-Assisted Intervention* (Springer, Berlin/Heidelberg, 2005), pp. 115–122
4. E. Asma, R. Manjeshwar, K. Thielemans, Theoretical comparison of motion correction techniques for PET image reconstruction, in *IEEE Nuclear Science Symposium and Medical Imaging Conference (NSS/MIC)*, San Diego, 2006, vol. 3, pp. 1762–1767
5. B.B. Avants, P.T. Schoenemann, J.C. Gee, Lagrangian frame diffeomorphic image registration: morphometric comparison of human and chimpanzee cortex. *Med. Image Anal.* **10**(3), 397–412 (2006)
6. W. Bai, M. Brady, Respiratory motion correction in PET images. *Phys. Med. Biol.* **54**, 2719–2736 (2009)
7. W. Bai, M. Brady, Spatio-temporal image registration for respiratory motion correction in PET, in *IEEE International Symposium on Biomedical Imaging: From Nano to Macro*, Boston, 2009, pp. 426–429
8. W. Bai, M. Brady, Motion correction and attenuation correction for respiratory gated PET images. *IEEE Trans. Med. Imaging* **30**(2), 351–365 (2011)
9. J.L. Barron, D.J. Fleet, S.S. Beauchemin, Performance of optical flow techniques. *Int. J. Comput. Vis.* **12**(1), 43–77 (1994)
10. D. Bérézziat, I. Herlin, L. Younes, A generalized optical flow constraint and its physical interpretation, in *IEEE Conference on Computer Vision and Pattern Recognition*, Hilton Head, 2000, vol. 2, pp. 487–492
11. T. Beyer, G. Antoch, T. Blodgett, L.F. Freudenberg, T. Akhurst, S. Mueller, Dual-modality PET/CT imaging: the effect of respiratory motion on combined image quality in clinical oncology. *Eur. J. Nucl. Med. Mol. Imaging* **30**, 588–596 (2003)
12. M. Blume, *Joint Image and Motion Reconstruction for Positron Emission Tomography*. PhD thesis, Technische Universität München, 2011
13. M. Blume, A. Martinez-Möller, A. Keil, N. Navab, M. Rafecas, Joint reconstruction of image and motion in gated positron emission tomography. *IEEE Trans. Med. Imaging* **29**(11), 1892–1906 (2010)

14. M. Blume, N. Navab, M. Rafecas, Joint image and motion reconstruction for PET using a B-spline motion model. *Phys. Med. Biol.* **57**(24), 8249–8270 (2012)
15. F.A. Bornemann, P. Deuffhard, The cascadic multigrid method for elliptic problems. *Numer. Math.* **75**(2), 135–152 (1996)
16. J. Brewer, Kronecker products and matrix calculus in system theory. *IEEE Trans. Circuits Syst.* **25**(9), 772–781 (1978)
17. C. Broit, *Optimal Registration of Deformed Images*. PhD thesis, University of Pennsylvania, Philadelphia, 1981
18. L.G. Brown, A survey of image registration techniques. *ACM Comput. Surv.* **24**(4), 325–376 (1992)
19. A. Bruhn, J. Weickert, C. Schnörr, Lucas/Kanade meets Horn/Schunck: combining local and global optic flow methods. *Int. J. Comput. Vis.* **61**, 211–231 (2005)
20. C. Brune, *4D Imaging in Tomography and Optical Nanoscopy*. PhD thesis, University of Münster, 2010
21. C. Buerger, C. Tsoumpas, A. Aitken, A.P. King, P. Schleyer, V. Schulz, P.K. Marsden, T. Schaeffter, Investigation of MR-based attenuation correction and motion compensation for hybrid PET/MR. *IEEE Trans. Nucl. Sci.* **59**(5), 1967–1976 (2012)
22. M. Burger, J. Modersitzki, L. Ruthotto, A hyperelastic regularization energy for image registration. *SIAM J. Sci. Comput.* **35**(1), B132–B148 (2013)
23. F. Büther, M. Dawood, L. Stegger, F. Wübbeling, M. Schäfers, O. Schober, K.P. Schäfers, List mode-driven cardiac and respiratory gating in PET. *J. Nucl. Med.* **50**(5), 674–681 (2009)
24. F. Büther, I. Ernst, J. Hamill, H.T. Eich, O. Schober, M. Schäfers, K.P. Schäfers, External radioactive markers for pet data-driven respiratory gating in positron emission tomography. *Eur. J. Nucl. Med. Mol. Imaging* **40**(4), 602–614 (2013)
25. Cardiac planes, <http://www.nuclearcardiologyseminars.net/images/cardiacplanes1.gif>. Online; Accessed 06 Apr 2014
26. R.E. Carson, Tracer kinetic modeling in PET, in *Positron Emission Tomography: Basic Sciences* (Springer, New York, 2005), pp. 127–159
27. H. Chang, J.M. Fitzpatrick, A technique for accurate magnetic resonance imaging in the presence of field inhomogeneities. *IEEE Trans. Med. Imaging* **11**(3), 319–329 (1992)
28. P. Charbonnier, L. Blanc-Feraud, G. Aubert, M. Barlaud, Two deterministic half-quadratic regularization algorithms for computed imaging, in *IEEE International Conference on Image Processing*, Austin, 1994, vol. 2, pp. 168–172
29. S.Y. Chun, T.G. Reese, J. Ouyang, B. Guerin, C. Catana, X. Zhu, N.M. Alpert, G. El Fakhri, MRI-based nonrigid motion correction in simultaneous PET/MRI. *J. Nucl. Med.* **53**(8), 1284–1291 (2012)
30. P.G. Ciarlet, *Mathematical Elasticity: Three-Dimensional Elasticity* (North Holland, Amsterdam/New York, 1988)
31. T. Corpetti, É. Mémin, P. Pérez, Dense motion analysis in fluid imagery, in *European Conference on Computer Vision*, Copenhagen (Springer, 2002), pp. 676–691
32. M. Dawood, *Respiratory Motion Correction on 3D Positron Emission Tomography Images*. PhD thesis, University of Münster, 2008
33. M. Dawood, C. Brune, F. Büther, X. Jiang, M. Burger, O. Schober, M. Schäfers, K.P. Schäfers, A continuity equation based optical flow method for cardiac motion correction in 3D PET data, in *Medical Image Computing and Computer-Assisted Intervention*, vol. 6326 (Springer, Berlin/Heidelberg, 2010), pp. 88–97
34. M. Dawood, F. Büther, X. Jiang, K.P. Schäfers, Respiratory motion correction in 3-D PET data with advanced optical flow algorithms. *IEEE Trans. Med. Imaging* **27**(8), 1164–1175 (2008)
35. M. Dawood, F. Büther, N. Lang, O. Schober, K.P. Schäfers, Respiratory gating in positron emission tomography: a quantitative comparison of different gating schemes. *Med. Phys.* **34**(7), 3067–3076 (2007)

36. M. Dawood, F. Büther, L. Stegger, X. Jiang, O. Schober, M. Schäfers, K.P. Schäfers, Optimal number of respiratory gates in positron emission tomography: a cardiac patient study. *Med. Phys.* **36**(5), 1775–1784 (2009)
37. M. Dawood, F. Gigengack, X. Jiang, K.P. Schäfers, A mass conservation-based optical flow method for cardiac motion correction in 3D-PET. *Med. Phys.* **40**(1), 012505 (2013)
38. M. Dawood, X. Jiang, K. Schäfers (eds.), *Correction Techniques in Emission Tomography*. Series in Medical Physics and Biomedical Engineering (CRC, Boca Raton, 2012)
39. N. Dikaos, D. Izquierdo-Garcia, M.J. Graves, V. Mani, Z.A. Fayad, T.D. Fryer, MRI-based motion correction of thoracic PET: initial comparison of acquisition protocols and correction strategies suitable for simultaneous PET/MRI systems. *Eur. Radiol.* **22**(2), 439–446 (2012)
40. M. Droske, M. Rumpf, A variational approach to nonrigid morphological image registration. *SIAM J. Appl. Math.* **64**(2), 668–687 (2003)
41. Y.E. Erdi, S.A. Nehmeh, T. Mulnix, J.L. Humm, C.C. Watson, PET performance measurements for an LSO-based combined PET/CT scanner using the national electrical manufacturers association NU 2-2001 standard. *J. Nucl. Med.* **45**(5), 813–821 (2004)
42. Y.E. Erdi, S.A. Nehmeh, T. Pan, A. Pevsner, K.E. Rosenzweig, G. Mageras, E.D. Yorke, H. Schoder, W. Hsiao, O.D. Squire, P. Vernon, J.B. Ashman, H. Mostafavi, S.M. Larson, J.L. Humm, The CT motion quantitation of lung lesions and its impact on PET-measured SUVs. *J. Nucl. Med.* **45**(8), 1287–1292 (2004)
43. M. Fieseler, F. Gigengack, X. Jiang, K.P. Schäfers, Motion correction of whole-body PET data with a joint PET-MRI registration functional. *BioMed. Eng. Online* **13**(Suppl 1), S2 (2014)
44. M. Fieseler, T. Kosters, F. Gigengack, H. Braun, H.H. Quick, K.P. Schäfers, X. Jiang, Motion correction in PET-MRI: a human torso phantom study, in *IEEE Nuclear Science Symposium and Medical Imaging Conference (NSS/MIC)*, Valencia, 2011, pp. 3586–3588
45. M. Fieseler, H. Kugel, F. Gigengack, T. Kösters, F. Büther, H.H. Quick, C. Faber, X. Jiang, K.P. Schäfers, A dynamic thorax phantom for the assessment of cardiac and respiratory motion correction in PET/MRI: a preliminary evaluation. *Nucl. Instrum. Methods Phys. Res. Sect. A: Accel. Spectrom. Detect. Assoc. Equip.* **702**, 59–63 (2013)
46. L. Fin, P. Bailly, J. Daouk, M.-E. Meyer, Motion correction based on an appropriate system matrix for statistical reconstruction of respiratory-correlated PET acquisitions. *Comput. Methods Programs Biomed.* **96**(3), e1–e9 (2009)
47. B. Fischer, J. Modersitzki, Fast diffusion registration. *AMS Contemp. Math. Inverse Probl. Image Anal. Med. Imaging* **313**, 117–129 (2002)
48. B. Fischer, J. Modersitzki, Ill-posed medicine—an introduction to image registration. *Inverse Probl.* **24**, 034008 (2008)
49. F. Gigengack, M. Fieseler, D. Tenbrinck, X. Jiang, Image processing techniques in emission tomography, in *Correction Techniques in Emission Tomography*. Series in Medical Physics and Biomedical Engineering (Taylor & Francis, London, 2012), pp. 119–156
50. F. Gigengack, L. Ruthotto, M. Burger, C.H. Wolters, X. Jiang, K.P. Schäfers, Motion correction of cardiac PET using mass-preserving registration, in *IEEE Nuclear Science Symposium and Medical Imaging Conference (NSS/MIC)*, Knoxville, 2010, pp. 3317–3319
51. F. Gigengack, L. Ruthotto, M. Burger, C.H. Wolters, X. Jiang, K.P. Schäfers, Motion correction in dual gated cardiac PET using mass-preserving image registration. *IEEE Trans. Med. Imaging* **31**(3), 698–712 (2012)
52. F. Gigengack, L. Ruthotto, X. Jiang, M. Burger, J. Modersitzki, C.H. Wolters, K.P. Schäfers, VAMPIRE, <http://vampire.uni-muenster.de>
53. F. Gigengack, L. Ruthotto, X. Jiang, J. Modersitzki, M. Burger, S. Hermann, K.P. Schäfers, Atlas-based whole-body PET-CT segmentation using a passive contour distance, in *Proceedings of MICCAI Workshop on Medical Computer Vision*, Nice (Springer, 2012), pp. 82–92
54. F. Gigengack, L. Ruthotto, T. Kösters, X. Jiang, J. Modersitzki, M. Burger, C.H. Wolters, K.P. Schäfers, Pipeline for motion correction in dual gated PET, in *IEEE Nuclear Science Symposium and Medical Imaging Conference (NSS/MIC)*, Anaheim, 2012
55. P.E. Gill, W. Murray, M.H. Wright, *Practical Optimization* (Academic, London, 1981)

56. G.W. Goerres, C. Burger, E. Kamel, B. Seifert, A.H. Kaim, A. Buck, T.C. Buehler, G.K. von Schulthess, Respiration-induced attenuation artifact at PET/CT: technical considerations. *Radiology* **226**(3), 906–910 (2003)
57. V. Gorbunova, J. Sporning, P. Lo, M. Loeve, H.A. Tiddens, M. Nielsen, A. Dirksen, M. de Bruijne, Mass preserving image registration for lung CT. *Med. Image Anal.* **16**, 786–795 (2012)
58. B. Guérin, S. Cho, S.Y. Chun, X. Zhu, N.M. Alpert, G. El Fakhri, T. Reese, C. Catana, Nonrigid PET motion compensation in the lower abdomen using simultaneous tagged-MRI and PET imaging. *Med. Phys.* **38**, 3025 (2011)
59. E. Haber, J. Modersitzki, Numerical methods for volume preserving image registration. *Inverse Probl.* **20**, 1621–1638 (2004)
60. E. Haber, J. Modersitzki, Image registration with guaranteed displacement regularity. *Int. J. Comput. Vis.* **71**(3), 361–372 (2007)
61. J. Hadamard, *Lectures on Cauchy's Problem in Linear Partial Differential Equations* (Yale University Press, New Haven, 1923)
62. J.J. Hamill, V.Y. Panin, TOF-MLAA for attenuation correction in thoracic PET/CT, in *IEEE Nuclear Science Symposium and Medical Imaging Conference (NSS/MIC)*, Anaheim, 2012, pp. 4040–4047
63. M. Holden, A review of geometric transformations for nonrigid body registration. *IEEE Trans. Med. Imaging* **27**(1), 111–128 (2008)
64. B.K.P. Horn, B.G. Schunck, Determining optical flow. *Artif. Intell.* **17**(1–3), 185–203 (1981)
65. H.M. Hudson, R.S. Larkin, Accelerated image reconstruction using ordered subsets of projection data. *IEEE Trans. Med. Imaging* **13**(4), 601–609 (1994)
66. B.F. Hutton, M. Braun, L. Thurffjell, D.Y. Lau, Image registration: an essential tool for nuclear medicine. *Eur. J. Nucl. Med.* **29**(4), 559–577 (2002)
67. D. Ionascu, S.B. Jiang, S. Nishioka, H. Shirato, R.I. Berbeco, Internal-external correlation investigations of respiratory induced motion of lung tumors. *Med. Phys.* **34**(10), 3893–903 (2007)
68. M.W. Jacobson, J.A. Fessler, Joint estimation of image and deformation parameters in motion-corrected PET, in *IEEE Nuclear Science Symposium and Medical Imaging Conference (NSS/MIC)*, Portland, 2003, vol. 5, pp. 3290–3294
69. S. Jan, G. Santin, D. Strul, S. Staelens, K. Assié, D. Autret, S. Avner, R. Barbier, M. Bardiès, P.M. Bloomfield, D. Brasse, V. Breton, P. Bruyndonckx, I. Buvat, A.F. Chatzioannou, Y. Choi, Y.H. Chung, C. Comtat, D. Donnarieix, L. Ferrer, S.J. Glick, C.J. Groiselle, D. Guez, P.-F. Honore, S. Kerhoas-Cavata, A.S. Kirov, V. Kohli, M. Koole, M. Krieguer, D.J. van der Laan, F. Lamare, G. LARGERON, C. Lartizien, D. Lazaro, M.C. Maas, L. Maigne, F. Mayet, F. Melot, C. Merheb, E. Pennacchio, J. Perez, U. Pietrzyk, F.R. Rannou, M. Rey, D.R. Schaart, C.R. Schmidtlein, L. Simon, T.Y. Song, J.-M. Vieira, D. Visvikis, R. Van de Walle, E. Wieërs, C. Morel, GATE: a simulation toolkit for PET and SPECT. *Phys. Med. Biol.* **49**(19), 4543–4561 (2004)
70. A.L. Kesner, G. Abourbeh, E. Mishani, R. Chisin, S. Tshori, N. Freedman, Gating, enhanced gating, and beyond: information utilization strategies for motion management, applied to preclinical PET. *EJNMMI Res.* **3**(1), 29 (2013)
71. G.J. Klein, Forward deformation of PET volumes using material constraints, in *IEEE Workshop on Biomedical Image Analysis*, Santa Barbara, 1998, pp. 64–71
72. G.J. Klein, Forward deformation of PET volumes using non-uniform elastic material constraints, in *Information Processing in Medical Imaging* (Springer, New York, 1999), pp. 358–363
73. J.K. Klein, R.H. Huesman, Four dimensional processing of deformable cardiac PET data. *Med. Image Anal.* **6**(1), 29–46 (2002)
74. G.J. Klein, B.W. Reutter, M.H. Ho, J.H. Reed, R.H. Huesman, Real-time system for respiratory-cardiac gating in positron tomography. *IEEE Trans. Nucl. Sci.* **45**(4), 2139–2143 (1998)

75. G.J. Klein, B.W. Reutter, R.H. Huesman, Non-rigid summing of gated PET via optical flow, in *IEEE Nuclear Science Symposium and Medical Imaging Conference (NSS/MIC)*, Anaheim, 1996, vol. 2
76. T. Kokki, H. Sipilä, M. Teräs, T. Noponen, N. Durand-Schaefer, R. Klén, J. Knuuti, Dual gated PET/CT imaging of small targets of the heart: method description and testing with a dynamic heart phantom. *J. Nucl. Cardiol.* **17**, 71–84 (2009)
77. T. Kösters, K.P. Schäfers, F. Wübbeling, EMRECON, <http://emrecon.uni-muenster.de>
78. T. Kösters, K.P. Schäfers, F. Wübbeling, EMRECON: an expectation maximization based image reconstruction framework for emission tomography data, in *IEEE Nuclear Science Symposium and Medical Imaging Conference (NSS/MIC)*, Valencia, 2011
79. F. Lamare, T. Cresson, J. Savean, C. Cheze Le Rest, A.J. Reader, D. Visvikis, Respiratory motion correction for PET oncology applications using affine transformation of list mode data. *Phys. Med. Biol.* **52**(1), 121–140 (2007)
80. F. Lamare, M.J. Ledesma Carbayo, T. Cresson, G. Kontaxakis, A. Santos, C.C. Le Rest, A.J. Reader, D. Visvikis, List-mode-based reconstruction for respiratory motion correction in PET using non-rigid body transformations. *Phys. Med. Biol.* **52**(17), 5187–5204 (2007)
81. F. Lamare, M. Teras, T. Kokki, H. Fayad, O. Rimoldi, P.G. Camici, J. Knuuti, D. Visvikis, Correction of respiratory motion in dual gated cardiac imaging in PET/CT, in *IEEE Nuclear Science Symposium and Medical Imaging Conference (NSS/MIC)*, Dresden, 2008, pp. 5264–5269
82. N. Lang, M. Dawood, F. Büther, O. Schober, M. Schäfers, K.P. Schäfers, Organ movement reduction in PET/CT using dual-gated list-mode acquisition. *Z. Med. Phys.* **16**(1), 93–100 (2006)
83. L. Li, Y. Yang, Optical flow estimation for a periodic image sequence. *IEEE Trans. Image Process.* **19**(1), 1–10 (2010)
84. T. Li, B. Thorndyke, E. Schreibmann, Y. Yang, L. Xing, Model-based image reconstruction for four-dimensional PET. *Med. Phys.* **33**(5), 1288–1298 (2006)
85. D.C. Liu, J. Nocedal, On the limited memory BFGS method for large scale optimization. *Math. Program.* **45**, 503–528 (1989)
86. B.D. Lucas, T. Kanade, An iterative image registration technique with an application to stereo vision, in *Proceedings of 7th International Joint Conference on Artificial Intelligence*, Vancouver, 1981, pp. 674–679
87. G. Lucignani, Respiratory and cardiac motion correction with 4D PET imaging: shooting at moving targets. *Eur. J. Nucl. Med. Mol. Imaging* **36**(2), 315–319 (2009)
88. J.B. Maintz, M.A. Viergever, A survey of medical image registration. *Med. Image Anal.* **2**(1), 1–36 (1998)
89. B.A. Mair, D.R. Gilland, J. Sun, Estimation of images and nonrigid deformations in gated emission CT. *IEEE Trans. Med. Imaging* **25**(9), 1130–1144 (2006)
90. T. Mäkelä, P. Clarysse, O. Sipilä, N. Pauna, Q.C. Pham, T. Katila, I.E. Magnin, A review of cardiac image registration methods. *IEEE Trans. Med. Imaging* **21**(9), 1011–1021 (2002)
91. T. Marin, J.G. Brankov, Deformable left-ventricle mesh model for motion-compensated filtering in cardiac gated SPECT. *Med. Phys.* **37**(10), 5471–5481 (2010)
92. A. Martinez-Möller, D. Zikic, R. Botnar, R. Bundschuh, W. Howe, S. Ziegler, N. Navab, M. Schwaiger, S. Nekolla, Dual cardiac-respiratory gated PET: implementation and results from a feasibility study. *Eur. J. Nucl. Med. Mol. Imaging* **34**, 1447–1454 (2007)
93. B. McCane, K. Novins, D. Crannitch, B. Galvin, On benchmarking optical flow. *Comput. Vis. Image Underst.* **84**(1), 126–143 (2001)
94. J. Modersitzki, *Numerical Methods for Image Registration* (Oxford University Press, New York, 2004)
95. J. Modersitzki, *FAIR: Flexible Algorithms for Image Registration* (SIAM, Philadelphia, 2009)
96. Y. Nakamoto, B.B. Chin, C. Cohade, M. Osman, M. Tatsumi, R.L. Wahl, PET/CT: artifacts caused by bowel motion. *Nucl. Med. Commun.* **25**(3), 221–225 (2004)

97. R. Narayanan, J.A. Fessler, H. Park, C.R. Meyer, Diffeomorphic nonlinear transformations: a local parametric approach for image registration, in *Information Processing in Medical Imaging* (Springer, New York, 2005), pp. 174–185
98. S.A. Nehmeh, Y.E. Erdi, Respiratory motion in positron emission tomography/computed tomography: a review. *Clin. Occup. Environ. Med.* **38**(3), 167–176 (2008)
99. A. Neumaier, Solving ill-conditioned and singular linear systems: a tutorial on regularization. *SIAM Rev.* **40**(3), 636–666 (1998)
100. J. Nocedal, S.J. Wright, *Numerical Optimization* (Springer, New York, 2000)
101. G. Noetscher, S.N. Makarov, N. Clow, Modeling accuracy and features of body-area networks with out-of-body antennas at 402 MHz. *IEEE Antennas Propag. Mag.* **53**(4), 118–143 (2011)
102. J. Nuyts, G. Bal, F. Kehren, M. Fenchel, C. Michel, C. Watson, Completion of a truncated attenuation image from the attenuated PET emission data. *IEEE Trans. Med. Imaging* **32**(2), 237–246 (2013)
103. J. Nuyts, P. Dupont, S. Stroobants, R. Benninck, L. Mortelmans, P. Suetens, Simultaneous maximum a posteriori reconstruction of attenuation and activity distributions from emission sinograms. *IEEE Trans. Med. Imaging* **18**(5), 393–403 (1999)
104. J. Olesch, L. Ruthotto, H. Kugel, S. Skare, B. Fischer, C.H. Wolters, A variational approach for the correction of field-inhomogeneities in EPI sequences, in *SPIE Medical Imaging Conference*, San Diego, 2010
105. M.M. Osman, C. Cohade, Y. Nakamoto, L.T. Marshall, J.P. Leal, R.L. Wahl, Clinically significant inaccurate localization of lesions with PET/CT: frequency in 300 patients. *J. Nucl. Med.* **44**(2), 240–243 (2003)
106. M.M. Osman, C. Cohade, Y. Nakamoto, R.L. Wahl, Respiratory motion artifacts on PET emission images obtained using CT attenuation correction on PET-CT. *Eur. J. Nucl. Med. Mol. Imaging* **30**, 603–606 (2003)
107. X. Pennec, R. Stefanescu, V. Arsigny, P. Fillard, N. Ayache, Riemannian elasticity: a statistical regularization framework for non-linear registration, in *Medical Image Computing and Computer-Assisted Intervention* (Springer, Berlin/Heidelberg, 2005), pp. 943–950
108. Y. Petibon, J. Ouyang, X. Zhu, C. Huang, T.G. Reese, S.Y. Chun, Q. Li, G. El Fakhri, Cardiac motion compensation and resolution modeling in simultaneous PET-MR: a cardiac lesion detection study. *Phys. Med. Biol.* **58**(7), 2085 (2013)
109. M. Phelps, *PET: Molecular Imaging and Its Biological Applications* (Springer, New York, 2004)
110. I. Polycarpou, C. Tsoumpas, P.K. Marsden, Analysis and comparison of two methods for motion correction in PET imaging. *Med. Phys.* **39**, 6474–6483 (2012)
111. F. Qiao, T. Pan, J.W. Clark Jr., O.R. Mawlawi, A motion-incorporated reconstruction method for gated PET studies. *Phys. Med. Biol.* **51**(15), 3769–3783 (2006)
112. M. Reyes, G. Malandain, P.M. Koulibaly, M.A. González-Ballester, J. Darcourt, Model-based respiratory motion compensation for emission tomography image reconstruction. *Phys. Med. Biol.* **52**(12), 3579–3600 (2007)
113. A. Rezaei, M. Defrise, G. Bal, C. Michel, M. Conti, C. Watson, J. Nuyts, Simultaneous reconstruction of activity and attenuation in time-of-flight PET. *IEEE Trans. Med. Imaging* **31**(12), 2224–2233 (2012)
114. C. Rischpler, S.G. Nekolla, I. Dregely, M. Schwaiger, Hybrid PET/MR imaging of the heart: potential, initial experiences, and future prospects. *J. Nucl. Med.* **54**(3), 402–415 (2013)
115. T. Rohlfing, Image similarity and tissue overlaps as surrogates for image registration accuracy: widely used but unreliable. *IEEE Trans. Med. Imaging* **31**(2), 153–163 (2012)
116. D. Ruan, J.A. Fessler, J.M. Balter, R.I. Berbeco, S. Nishioka, H. Shirato, Inference of hysteretic respiratory tumor motion from external surrogates: a state augmentation approach. *Phys. Med. Biol.* **53**(11), 2923 (2008)

117. D. Rueckert, P. Aljabar, R.A. Heckemann, J.V. Hajnal, A. Hammers, Diffeomorphic registration using B-splines, in *Medical Image Computing and Computer-Assisted Intervention*, ed. by R. Larsen, M. Nielsen, J. Sporring. Volume 4191 of LNCS (Springer, Berlin/Heidelberg, 2006), pp. 702–709
118. L. Ruthotto, *Mass-Preserving Registration of Medical Images*. German diploma thesis (Mathematics), Institute for Computational and Applied Mathematics, University of Münster, 2010
119. L. Ruthotto, F. Gigengack, M. Burger, C.H. Wolters, X. Jiang, K.P. Schäfers, J. Modersitzki, A simplified pipeline for motion correction in dual gated cardiac PET, in *Bildverarbeitung für die Medizin* (Springer, Berlin/Heidelberg, 2012), pp. 51–56
120. K.C. Schmidt, F.E. Turkheimer, Kinetic modeling in positron emission tomography. *Q. J. Nucl. Med.* **46**(1), 70–85 (2002)
121. H. Schumacher, J. Modersitzki, B. Fischer, Combined reconstruction and motion correction in SPECT imaging. *IEEE Trans. Nucl. Sci.* **56**, 73–80 (2009)
122. A.J. Schwarz, M.O. Leach, Implications of respiratory motion for the quantification of 2D MR spectroscopic imaging data in the abdomen. *Phys. Med. Biol.* **45**(8), 2105–2116 (2000)
123. W.P. Segars, M. Mahesh, T.J. Beck, E.C. Frey, B.M.W. Tsui, Realistic CT simulation using the 4d XCAT phantom. *Med. Phys.* **35**(8), 3800–3808 (2008)
124. L.A. Shepp, Y. Vardi, Maximum likelihood reconstruction for emission tomography. *IEEE Trans. Med. Imaging* **1**(2), 113–122 (1982)
125. D. Sun, S. Roth, M.J. Black. A quantitative analysis of current practices in optical flow estimation and the principles behind them. *Int. J. Comput. Vis.* **106**(2), 115–137 (2014)
126. D. Tenbrinck, S. Schmid, X. Jiang, K.P. Schäfers, J. Stypmann, Histogram-based optical flow for motion estimation in ultrasound imaging. *J. Math. Imaging Vis.* **47**(1–2), 138–150 (2013)
127. M. Teräs, T. Kokki, N. Durand-Schaefler, T. Noponen, M. Pietilä, J. Kiss, E. Hoppela, H. Sipilä, J. Knuuti, Dual-gated cardiac PET—clinical feasibility study. *Eur. J. Nucl. Med. Mol. Imaging* **37**, 505–516 (2010)
128. K. Thielemans, E. Asma, R.M. Manjeshwar, Mass-preserving image registration using free-form deformation fields, in *IEEE Nuclear Science Symposium and Medical Imaging Conference (NSS/MIC)*, Orlando, 2009
129. H. Ue, H. Haneishi, H. Iwanaga, K. Suga, Nonlinear motion correction of respiratory-gated lung SPECT images. *IEEE Trans. Med. Imaging* **25**(4), 486–495 (2006)
130. A. Van Der Gucht, B. Serrano, F. Hugonnet, B. Paulmier, N. Garnier, M. Faraggi, Impact of a new respiratory amplitude-based gating technique in evaluation of upper abdominal PET lesions. *Eur. J. Radiol.* **83**(3), 509–515 (2014)
131. W. van Elmpt, J. Hamill, J. Jones, D. De Ruyscher, P. Lambin, M. Öllers, Optimal gating compared to 3D and 4D PET reconstruction for characterization of lung tumours. *Eur. J. Nucl. Med. Mol. Imaging* **38**, 843–855 (2011)
132. T. Vercauteren, X. Pennec, A. Perchant, N. Ayache, Diffeomorphic demons: efficient non-parametric image registration. *NeuroImage* **45**(1), S61–S72 (2009)
133. D. Visvikis, O. Barret, T.D. Fryer, F. Lamare, A. Turzo, Y. Bizais, C.C. Le Rest, Evaluation of respiratory motion effects in comparison with other parameters affecting PET image quality, in *IEEE Nuclear Science Symposium and Medical Imaging Conference (NSS/MIC)*, Rome, 2004, vol. 6, pp. 3668–3672
134. Y. Wang, E. Vidan, G.W. Bergman, Cardiac motion of coronary arteries: variability in the rest period and implications for coronary MR angiography. *Radiology* **213**(3), 751–758 (1999)
135. J. Weickert, A. Bruhn, T. Brox, N. Papenberg, *A Survey on Variational Optic Flow Methods for Small Displacements*. Volume 10 of Mathematics in Industry (Springer, Berlin, 2006), pp. 103–136
136. C. Würslin, H. Schmidt, P. Martirosian, C. Brendle, A. Boss, N.F. Schwenzer, L. Stegger, Respiratory motion correction in oncologic PET using T1-weighted MR imaging on a simultaneous whole-body PET/MR system. *J. Nucl. Med.* **54**(3), 464–471 (2013)

137. D. Yang, H. Li, D.A. Low, J.O. Deasy, I. El Naqa, A fast inverse consistent deformable image registration method based on symmetric optical flow computation. *Phys. Med. Biol.* **53**(21), 6143 (2008)
138. Y. Yin, E.A. Hoffman, C.L. Lin, Mass preserving nonrigid registration of CT lung images using cubic B-spline. *Med. Phys.* **36**(9), 4213–4222 (2009)
139. B. Zitova, J. Flusser, Image registration methods: a survey. *Image Vis. Comput.* **21**(11), 977–1000 (2003)