参考文献

[1] 汪成为. 灵境 (虚拟现实) 是建立人机和谐仿真系统的关键技术[J]. 系统仿真学报，1995，7(4): 1-4.

[2] 汪成为，高文，王行仁. 灵境（虚拟现实）技术的理论、实现及应用[M]. 清华大学出版社与广西科学技术出版社，1996

[3] 赵沁平. 虚拟现实综述[J]. 中国科学: 信息科学，2009 (1): 2-46.

[4] Sutherland I E. The ultimate display[C]//Proceedings of the IFIP Congress. 1965，2(506-508): 506-508.

[5] Fisher S S， McGreevy M， Humphries J， et al. Virtual environment display system[C]//Proceedings of the 1986 workshop on Interactive 3D graphics. 1987: 77-87.

[6] Heim M. The metaphysics of virtual reality[M]. Oxford University Press，USA，1993.

[7] Burdea G C，Coiffet P. Virtual reality technology[M]. John Wiley & Sons，2003.

[8] 苗兰芳. 点模型的表面几何建模和绘制[D]. 浙江: 浙江大学，2005

[9] Adams B. Point-based modeling，animation and rendering of dynamic objects[D]. PhD thesis，Katholieke Universiteit Leuven，2006.

[10] 宋超. 基于物理的弹性变形模拟技术研究[D]. 浙江: 浙江大学，2008

[11] Gross M. Point based graphics: state of the art and recent advances[J]. ACM SIGGRAPH 2009 Courses，2009: 1-68.

[12] Kang Z，Li J，Zhang L，et al. Automatic registration of terrestrial laser scanning point clouds using panoramic reflectance images[J]. Sensors，2009，9(4): 2621-2646.

[13] Xin W，Pu J. An improved ICP algorithm for point cloud registration[C]//2010 International Conference on Computational and Information Sciences. IEEE，2010: 565-568.

[14] 薛耀红，梁学章，马婷，梁英，车翔玖. 扫描点云的一种自动配准方法[J].计算机辅助设计与图形学学报，2011，23(2): 223-231

[15] Krishnan S，Lee P Y，Moore J B，et al. Global registration of multiple 3D point sets via optimization-on-a-manifold[C]//Symposium on geometry processing. 2005: 187-196.

[16] Liu J，Ren Z. The research and application of the multi-view registration[C]//2010 3rd international congress on image and signal processing. IEEE，2010，3: 1258-1262.

[17] Fleishman S，Drori I，Cohen-Or D. Bilateral mesh denoising[M]//ACM SIGGRAPH 2003 Papers. 2003: 950-953.

[18] Jones T R， Durand F， Desbrun M. Non-iterative， feature-preserving mesh smoothing[M]//ACM SIGGRAPH 2003 Papers. 2003: 943-949.

[19] 缪永伟. 点模型的几何处理和形状编辑[D]. 浙江: 浙江大学，2007

[20] Zwicker M，Pauly M，Knoll O，et al. Pointshop 3D: An interactive system for point-based surface editing[J]. ACM Transactions on Graphics (TOG)，2002，21(3): 322-329.

[21] Rusinkiewicz S， Levoy M. QSplat: A multiresolution point rendering system for large meshes[C]//Proceedings of the 27th annual conference on Computer graphics and interactive techniques. 2000: 343-352.

[22] Pfister H， Zwicker M， Van Baar J， et al. Surfels: Surface elements as rendering primitives[C]//Proceedings of the 27th annual conference on Computer graphics and interactive techniques. 2000: 335-342.

[23] Zwicker M，Pfister H，Van Baar J，et al. Surface splatting[C]//Proceedings of the 28th annual conference on Computer graphics and interactive techniques. 2001: 371-378.

[24] Müller M，Keiser R，Nealen A，et al. Point based animation of elastic，plastic and melting objects[C]//Proceedings of the 2004 ACM SIGGRAPH/Eurographics symposium on Computer animation. 2004: 141-151.

[25] 宋超，张宏鑫，黄劲，鲍虎军. 骨架驱动的快速似然弹性变形[J]. 计算机学报，2006，29(12): 2194-2200

[26] Pauly M，Gross M，Kobbelt L P. Efficient simplification of point-sampled surfaces[C]//IEEE Visualization，2002. VIS 2002. IEEE，2002: 163-170.

[27] 戴静兰. 海量点云预处理算法研究[D]. 浙江: 浙江大学，2006

[28] Alexa M.，Behr J.，Cohen-Or D.，Fleishman S.，Levin D.，Silva C. T. Computing and rendering point set surfaces[J]. IEEE Transactions on Visualization and Computer Graphics，2003，9 (1): 3-15

[29] Song H.，Feng H.Y. A global clustering approach to point cloud simplification with a specified data reduction ratio[J]. Computer-Aided Design，2008: 40(3): 281-292

[30] Li L，Chen S Y，Guan Q，et al. Point cloud simplification based on an affinity propagation clustering algorithm[C]//2009 International Conference on Artificial Intelligence and Computational Intelligence. IEEE，2009，3: 163-167.

[31] Shi B.Q.，Liang J.，Liu Q. Adaptive simplification of point cloud using k-means clustering[J]. Computer-Aided Design，2011: 43(8): 910-922

[32] Yu Z. An efficient local clustering approach for simplification of 3D point-based computer graphics models[C]//2006 IEEE International Conference on Multimedia and Expo. IEEE，2006: 2065-2068.

[33] Peng X，Huang W，Wen P，et al. Simplification of scattered point cloud based on feature extraction[C]//2009 Third International Conference on Genetic and Evolutionary Computing. IEEE，2009: 335-338.

[34] Wu J，Kobbelt L. Optimized sub-sampling of point sets for surface splatting[C]//Computer Graphics Forum. Oxford，UK and Boston，USA: Blackwell Publishing，Inc，2004，23(3): 643-652.

[35] 苗兰芳，彭群生. 点模型的面元重建和简化[J]. 浙江大学学报，2006，40(12): 2073-2078

[36] 李乐庆. 基于点云的模型重建与绘制技术研究[D]. 陕西: 西北大学. 2009

[37] Levoy M.，Whitted T. The use of points as display primitives[R]. Technical report TR 85-022，CS Departement，University of North Carolina at Chapel Hill. January 1985.

[38] Botsch M，Hornung A，Zwicker M，et al. High-quality surface splatting on today's GPUs[C]//Proceedings Eurographics/IEEE VGTC Symposium Point-Based Graphics，2005. IEEE，2005: 17-141.

[39] Weyrich T.，Heinzle S.，Aila T.，Fasnacht D. B.，Oetiker S.，Botsch M.，Flaig C.，Mall S.，Rohre K.，Felber N.，Kaeslin H.，Gross M. A Hardware Architecture for Surface Splatting[J]. ACM Transactions on Graphics，2007， 26(3): 90.1-90.11

[40] Heinzle S，Saurer O，Axmann S，et al. A transform，lighting and setup ASIC for surface splatting[C]//2008 IEEE International Symposium on Circuits and Systems (ISCAS). IEEE，2008: 2813-2816.

[41] Huang D，Lan J，Liu W，et al. High efficiency real time rendering for point-based model on gpu[C]//2009 International Conference on Multimedia Information Networking and Security. IEEE，2009，1: 296-300.

[42] 陈为，夏佳志，张龙，于洋，郑文庭，彭群生. 一种统一的硬件加速自适应 EWA Splatting 算法[J]. 计算机学报，2009，32(8): 1571-1581

[43] Rusinkiewicz S，Levoy M. Streaming QSplat: A viewer for networked visualization of large，dense models[C]//Proceedings of the 2001 symposium on Interactive 3D graphics. 2001: 63-68.

[44] 张龙，董朝，陈为，彭群生. 大规模点模型的实时高质量绘制[J]. 计算机学报，2005，28(2): 241-249

[45] Dachsbacher C，Vogelgsang C，Stamminger M. Sequential point trees[J]. ACM Transactions on Graphics (TOG)，2003，22(3): 657-662.

[46] Wimmer M， Scheiblauer C. Instant points: fast rendering of unprocessed point clouds[C]//Proceedings of the 3rd Eurographics/IEEE VGTC conference on Point-Based Graphics. 2006: 129-137.

[47] Goswami P，Zhang Y，Pajarola R，et al. High quality interactive rendering of massive point models using multi-way kd-trees[C]//2010 18th Pacific Conference on Computer Graphics and Applications. IEEE，2010: 93-100.

[48] Bai X，Liu W，Tu Z. Integrating contour and skeleton for shape classification[C]//2009 IEEE 12th international conference on computer vision workshops，ICCV workshops. IEEE，2009: 360-367.

[49] Yan H B，Hu S，Martin R R，et al. Shape deformation using a skeleton to drive simplex transformations[J]. IEEE Transactions on Visualization and Computer Graphics，2008，14(3): 693-706.

[50] De Aguiar E，Theobalt C，Thrun S，et al. Automatic conversion of mesh animations into skeleton-based animations[C]//Computer Graphics Forum. Oxford，UK: Blackwell Publishing Ltd，2008，27(2): 389-397.

[51] Bai X，Latecki L J. Path similarity skeleton graph matching[J]. IEEE transactions on pattern analysis and machine intelligence，2008，30(7): 1282-1292.

[52] Cornea N D，Silver D，Min P. Curve-skeleton properties，applications，and algorithms[J]. IEEE Transactions on visualization and computer graphics，2007，13(3): 530.

[53] Aujay G， Hétroy F， Lazarus F， et al. Harmonic skeleton for realistic character animation[C]//SCA 2007-ACM-SIGGRAPH/Eurographics Symposium on Computer Animation. Eurographics Association，2007: 151-160.

[54] Dey T. K.， Sun J. Defining and computing curve skeletons with medial geodesic function[C]//Proceedings of the fourth Eurographics symposium on Geometry processing. 2006: 143-152

[55] Sun X.P.，Pan J.，Wei X.P. 3D Mesh Skeleton Extraction Using Prominent Segmentation[J]. Computer Science and Information Systems，2010，7(1): 63-74

[56] Au O. K.-C.，Tai C.-L.，Chu H.-K.，Cohen-Or D.，Lee T.-Y. Skeleton extraction by mesh contraction[J]. ACM Transactions on Graphics (SIGGRAPH 2008)，2008，27(3): 44:1–44:10

[57] Franck Multon，Laure France，Marie-Paule Cani，Gilles Debunne . Computer Animation of Human Walking: a Survey.Journal of Visualization and Computer Animation (JVCA)[J]，1999，10:39-54

[58] Van Welbergen H，Van Basten B J H，Egges A，et al. Real time animation of virtual humans: a trade-off between naturalness and control[C]//Computer Graphics Forum. Oxford，UK: Blackwell Publishing Ltd，2010，29(8): 2530-2554.

[59] 代晓清. 基于运动捕获的运动重定向技术研究[D]. 天津：天津大学，2007

[60] 孙军. 基于运动捕获数据的运动混合技术研究与实现[D]. 武汉: 华中科技大学，2007

[61] 程熙. 交互式虚拟人运动生成与控制算法研究[D]. 浙江: 浙江大学，2010

[62] 王菁. 基于运动捕获数据的虚拟人运动合成的研究与实现[D]. 北京: 北京航空航天大学，2005

[63] Hodgins J K，Wooten W L，Brogan D C，et al. Animating human athletics[C]//Proceedings of the 22nd annual conference on Computer graphics and interactive techniques. 1995: 71-78.

[64] Wooten W L，Hodgins J K. Animation of human diving[C]//Computer Graphics Forum. Edinburgh，UK: Blackwell Science Ltd，1996，15(1): 3-13.

[65] Laszlo J，van de Panne M，Fiume E. Limit cycle control and its application to the animation of balancing and walking[C]//Proceedings of the 23rd annual conference on Computer graphics and interactive techniques. 1996: 155-162.

[66] H.Ko，N.Badler. Animating human locomotion with inverse dynamics . IEEE Computer Graphics and Applications[J]，1996，16(2):50-58

[67] Hodgins J K，Pollard N S. Adapting simulated behaviors for new characters[C]//Proceedings of the 24th annual conference on Computer graphics and interactive techniques. 1997: 153-162

[68] Faloutsos P，Van de Panne M，Terzopoulos D. Composable controllers for physics-based character animation[C]//Proceedings of the 28th annual conference on Computer graphics and interactive techniques. 2001: 251-260.

[69] Neff M，Fiume E. Modeling tension and relaxation for computer animation[C]//Proceedings of the 2002 ACM SIGGRAPH/Eurographics symposium on Computer animation. 2002: 81-88.

[70] Neff M，Fiume E. AER: Aesthetic Exploration and Refinement for expressive character animation[C]//Proceedings of the 2005 ACM SIGGRAPH/Eurographics symposium on Computer animation. 2005: 161-170.

[71] KangKang Yin ，Kevin Loken ，Michiel van de Panne，SIMBICON: simple biped locomotion control，ACM Transactions on Graphics (TOG)[J]，2007，26(3)

[72] Stelian Coros ，Philippe Beaudoin ，Kang Kang Yin ，Michiel van de Pann，Synthesis of constrained walking skills，ACM Transactions on Graphics (TOG)[J]，2008，27(5)

[73] Coros S，Beaudoin P，Van de Panne M. Robust task-based control policies for physics-based characters[M]//ACM SIGGRAPH Asia 2009 papers. 2009: 1-9.

[74] Wang J M，Fleet D J，Hertzmann A. Optimizing walking controllers[M]//ACM SIGGRAPH Asia 2009 papers. 2009: 1-8.

[75] Kovar L，Gleicher M，Pighin F. Motion graphs. ACM Trans on Graphics[J]，2002，21(3): 473-482

[76] Arikan O，Forsyth D A. Interactive motion generation from examples[J]. ACM Transactions on Graphics (TOG)，2002，21(3): 483-490.

[77] 李锦丹. 基于运动图的运动合成方法研究[D]. 北京: 首都师范大学，2008

[78] Park S I， Shin H J， Shin S Y. On-line locomotion generation based on motion blending[C]//Proceedings of the 2002 ACM SIGGRAPH/Eurographics symposium on Computer animation. 2002: 105-111.

[79] Park S I，Shin H J，Kim T H，et al. On-line motion blending for real-time locomotion generation[J]. Computer Animation and Virtual Worlds，2004，15(3-4): 125-138.

[80] Jenkins O C，Mataric M J. Automated derivation of behavior vocabularies for autonomous humanoid motion[C]//Proceedings of the second international joint conference on Autonomous agents and multiagent systems. 2003: 225-232.

[81] Barbič J， Safonova A， Pan J Y， et al. Segmenting motion capture data into distinct behaviors[C]//Proceedings of Graphics Interface 2004. 2004: 185-194.

[82] Kwon T，Shin S Y. Motion modeling for on-line locomotion synthesis[C]//Proceedings of the 2005 ACM SIGGRAPH/Eurographics symposium on Computer animation. 2005: 29-38.

[83] 宗丹，李淳芃，夏时洪，等. 基于关键姿态分析的运动图自动构建[J]. 计算机研究与发展，2010 (8): 1321-1328.

[84] Safonova A， Hodgins J K. Construction and optimal search of interpolated motion graphs[M]//ACM SIGGRAPH 2007 papers. 2007: 106-es.

[85] Shin H J， Oh H S. Fat graphs: constructing an interactive character with continuous controls[C]//Proceedings of the 2006 ACM SIGGRAPH/Eurographics symposium on Computer animation. 2006: 291-298.

[86] Heck R，Gleicher M. Parametric motion graphs[C]//Proceedings of the 2007 symposium on Interactive 3D graphics and games. 2007: 129-136.

[87] Witkin A，Kass M. Spacetime constraints[J]. ACM Siggraph Computer Graphics，1988，22(4): 159-168.

[88] 许威威，潘志庚，葛云芳. 基于足迹采样的运动编辑. 计算机辅助设计学学报[J]，2003，15(7): 805-811

[89] Safonova A，Hodgins J K，Pollard N S. Synthesizing physically realistic human motion in low-dimensional，behavior-specific spaces[J]. ACM Transactions on Graphics (ToG)，2004，23(3): 514-521.

[90] Wang L C T，Chen C C. A combined optimization method for solving the inverse kinematics problems of mechanical manipulators[J]. IEEE Transactions on Robotics and Automation，1991，7(4): 489-499.

[91] Komura T，Kuroda A，Kudoh S，et al. An inverse kinematics method for 3d figures with motion data[C]//Proceedings Computer Graphics International 2003. IEEE，2003: 266-271.

[92] Baerlocher P，Boulic R. An inverse kinematics architecture enforcing an arbitrary number of strict priority levels[J]. The visual computer，2004，20(6): 402-417.

[93] Buss S R. Introduction to inverse kinematics with jacobian transpose，pseudoinverse and damped least squares methods[J]. IEEE Journal of Robotics and Automation，2004，17(1-19): 16.

[94] Engell-Nørregård M. Inverse Kinematics The state of the art[J]. University of Copenhagen，Denmark，graduate project，2007: 1-23.

[95] Engell-Nørregård M，Erleben K. A projected back-tracking line-search for constrained interactive inverse kinematics[J]. Computers & Graphics，2011，35(2): 288-298.

[96] Shin H J，Kovar L，Gleicher M. Physical touch-up of human motions[C]//11th Pacific Conference onComputer Graphics and Applications，2003. Proceedings. IEEE，2003: 194-203.

[97] Zordan V B，Van Der Horst N C. Mapping optical motion capture data to skeletal motion using a physical model[C]//Proceedings of the 2003 ACM SIGGRAPH/Eurographics symposium on Computer animation. 2003: 24

[98] 魏毅，夏时洪，王兆其. 基于物理的人体空中运动仿真. 软件学报[J],2008，19(12): 3228-3236

[99] 潘志庚，程熙，唐冰. 一种实时虚拟人体反应式动画生成算法. 计算机研究与发展[J]. 2009 年 01 期

[100] Zordan V B，Majkowska A，Chiu B，et al. Dynamic response for motion capture animation[J]. ACM Transactions on Graphics (TOG)，2005，24(3): 697-701.

[101] Ye Y，Liu C K. Synthesis of responsive motion using a dynamic model[C]//Computer Graphics Forum. Oxford，UK: Blackwell Publishing Ltd，2010，29(2): 555-562.

[102] Lucy L B. A numerical approach to the testing of the fission hypothesis[J]. Astronomical Journal，vol. 82，Dec. 1977，p. 1013-1024.，1977，82: 1013-1024.

[103] Gingold R A，Monaghan J J. Smoothed particle hydrodynamics: theory and application to non-spherical stars[J]. Monthly notices of the royal astronomical society，1977，181(3): 375-389.

[104] Baraff D，Witkin A. Large steps in cloth simulation[C]//Proceedings of the 25th annual conference on Computer graphics and interactive techniques. 1998: 43-54.

[105] Teschner M，Heidelberger B，Muller M，et al. A versatile and robust model for geometrically complex deformable solids[C]//Proceedings Computer Graphics International，2004. IEEE，2004: 312-319.

[106] Bodin K，Lacoursiere C，Servin M. Constraint fluids[J]. IEEE Transactions on Visualization and Computer Graphics，2011，18(3): 516-526.

[107] Müller M，Charypar D，Gross M H. Particle-based fluid simulation for interactive applications[C]//Symposium on Computer animation. 2003，2: 18.

[108] Solenthaler B，Pajarola R. Predictive-corrective incompressible SPH[M]//ACM SIGGRAPH 2009 papers. 2009: 1-6.

[109] Clavet S，Beaudoin P，Poulin P. Particle-based viscoelastic fluid simulation[C]//Proceedings of the 2005 ACM SIGGRAPH/Eurographics symposium on Computer animation. 2005: 219-228.

[110] Alduán I，Otaduy M A. SPH granular flow with friction and cohesion[C]//Proceedings of the 2011 ACM SIGGRAPH/Eurographics symposium on computer animation. 2011: 25-32.

[111] Schechter H，Bridson R. Ghost SPH for animating water[J]. ACM Transactions on Graphics (TOG)，2012，31(4): 1-8.

[112] Monaghan J J. SPH without a tensile instability[J]. Journal of computational physics，2000，159(2): 290-311.

[113] Fedkiw R，Stam J，Jensen H W. Visual simulation of smoke[C]//Proceedings of the 28th annual conference on Computer graphics and interactive techniques. 2001: 15-22.

[114] Lentine M，Aanjaneya M，Fedkiw R. Mass and momentum conservation for fluid simulation[C]//Proceedings of the 2011 ACM SIGGRAPH/Eurographics Symposium on computer animation. 2011: 91-100.

[115] Hong J M，Lee H Y，Yoon J C，et al. Bubbles alive[J]. ACM Transactions on Graphics (TOG)，2008，27(3): 1-4.

[116] Yuan C，Liang X，Hao S，et al. Modelling cumulus cloud shape from a single image[C]//Computer Graphics Forum. 2014，33(6): 288-297.

[117] Yuan C，Guo J. An efficient framework for modeling clouds from Landsat8 images[C]//Sixth International Conference on Graphic and Image Processing (ICGIP 2014). SPIE，2015，9443: 427-431.

[118] Iwasaki K，Dobashi Y，Okabe M. Example-based synthesis of three-dimensional clouds from photographs[C]//Proceedings of the Computer Graphics International Conference. 2017: 1-6.

[119] Zhou L，Kambhamettu C，Goldgof D B，et al. Tracking nonrigid motion and structure from 2D satellite cloud images without correspondences[J]. IEEE transactions on Pattern analysis and machine intelligence，2001，23(11): 1330-1336.

[120] Hartmann D L. Global physical climatology[M]. Newnes，2015.

[121] Zhu Z，Woodcock C E. Object-based cloud and cloud shadow detection in Landsat imagery[J]. Remote sensing of environment，2012，118: 83-94.

[122] Irish R R，Barker J L，Goward S N，et al. Characterization of the Landsat-7 ETM+ automated cloud-cover assessment (ACCA) algorithm[J]. Photogrammetric engineering & remote sensing，2006，72(10): 1179-1188.

[123] Oreopoulos L，Wilson M J，Várnai T. Implementation on Landsat data of a simple cloud-mask algorithm developed for MODIS land bands[J]. IEEE Geoscience and Remote Sensing Letters，2011，8(4): 597-601.

[124] 陈渭民. 卫星气象学[M]. 气象出版社，2017.

[125] Kokhanovsky A A，Rozanov V V. Simple approximate solutions of the radiative transfer equation for a cloudy atmosphere[C]//Remote Sensing of Clouds and the Atmosphere IX. SPIE，2004，5571: 86-93.

[126] Luo Y，Trishchenko A P，Khlopenkov K V. Developing clear-sky，cloud and cloud shadow mask for producing clear-sky composites at 250-meter spatial resolution for the seven MODIS land bands over Canada and North America[J]. Remote Sensing of Environment，2008，112(12): 4167-4185.

[127] Berendes T，Sengupta S K，Welch R M，et al. Cumulus cloud base height estimation from high spatial resolution Landsat data: A Hough transform approach[J]. IEEE Transactions on geoscience and remote sensing，1992，30(3): 430-443.

[128] Dekel T，Oron S，Rubinstein M，et al. Best-buddies similarity for robust template matching[C]//Proceedings of the IEEE conference on computer vision and pattern recognition. 2015: 2021-2029.

[129] Ojala T，Pietikäinen M，Mäenpää T. Gray scale and rotation invariant texture classification with local binary patterns[C]//Computer Vision-ECCV 2000: 6th European Conference on Computer Vision Dublin，Ireland，June 26–July 1，2000 Proceedings，Part I 6. Springer Berlin Heidelberg，2000: 404-420.

[130] Ojala T，Pietikainen M，Maenpaa T. Multiresolution gray-scale and rotation invariant texture classification with local binary patterns[J]. IEEE Transactions on pattern analysis and machine intelligence，2002，24(7): 971-987.

[131] Palaniappan K，Kambhamettu C，Hasler A F，et al. Structure and semi-fluid motion analysis of stereoscopic satellite images for cloud tracking[C]//Proceedings of IEEE International Conference on Computer Vision. IEEE，1995: 659-665.

[132] Dobashi Y，Nishita T，Yamashita H，et al. Using metaballs to modeling and animate clouds from satellite images[J]. The Visual Computer，1999，15: 471-482.

[133] Dobashi Y，Yamamoto T，Nishita T. Interactive and realistic visualization system for earth-scale clouds[C]//Pacific graphics. 2009，1.

[134] Alvarez L，Castano C，Garcia M，et al. 3D atmospheric cloud structures: Processing and visualization[C]//Video presentation at IEEE Conf. on Computer Vision and Pattern Recognition. 2006.

[135] Kuji M，Nakajima T. Retrieval of cloud geometrical parameters using remote sensing data[C]//Optical Remote Sensing of the Atmosphere and Clouds II. SPIE，2001，4150: 225-234.

[136] Zhu Z，Woodcock C E. Object-based cloud and cloud shadow detection in Landsat imagery[J]. Remote sensing of environment，2012，118: 83-94.

[137] Liou K N. An introduction to atmospheric radiation[M]. Elsevier，2002.

[138] Hocking J，Francis P N，Saunders R. Cloud detection in Meteosat second generation imagery at the Met Office[J]. Meteorological Applications，2011，18(3): 307-323.

[139] 刘健，李云. 风云二号静止气象卫星的云相态识别算法[J]. 红外与毫米波学报，2011，30(4): 322-327.

[140] Strabala K I，Ackerman S A，Menzel W P. Cloud Properties inferred from 8 12-μm Data[J]. Journal of Applied Meteorology and Climatology，1994，33(2): 212-229.

[141] 许健民，张文建，杨军. 风云二号卫星业务产品与卫星数据格式实用手册[J]. 2008.

[142] Szejwach G. Determination of semi-transparent cirrus cloud temperature from infrared radiances: Application to METEOSAT[J]. Journal of Applied Meteorology and Climatology，1982，21(3): 384-393.

[143] Nakajima T，King M D. Determination of the optical thickness and effective particle radius of clouds from reflected solar radiation measurements. Part I: Theory[J]. Journal of Atmospheric Sciences，1990，47(15): 1878-1893.

[144] Kokhanovsky A. Optical properties of terrestrial clouds[J]. Earth-Science Reviews，2004，64(3-4): 189-241.

[145] Pandey P，De Ridder K，Gillotay D，et al. Estimating cloud optical thickness and associated surface UV irradiance from SEVIRI by implementing a semi-analytical cloud retrieval algorithm[J]. Atmospheric Chemistry and Physics，2012，12(17): 7961-7975.

[146] Nauss T，Kokhanovsky A A. Retrieval of warm cloud optical properties using simple approximations[J]. Remote Sensing of Environment，2011，115(6): 1317-1325.

[147] Slingo A. A GCM parameterization for the shortwave radiative properties of water clouds[J]. Journal of Atmospheric Sciences，1989，46(10): 1419-1427.

[148] Setvák M，DOSWELL C. The AVHRR channel 3 cloud top reflectivity of convective storms[J]. Monthly Weather Review，1991，119(3): 841-847.

[149] Kokhanovsky A A，Nauss T. Satellite-based retrieval of ice cloud properties using a semianalytical algorithm[J]. Journal of Geophysical Research: Atmospheres，2005，110(D19).

[150] Fu Q，Liou K N. Parameterization of the radiative properties of cirrus clouds[J]. Journal of Atmospheric Sciences，1993，50(13): 2008-2025.

[151] Riley K，Ebert D，Hansen C，et al. Visually accurate multi-field weather visualization[C]//IEEE Visualization，2003. VIS 2003. IEEE，2003: 279-286.

[152] Zhang H，Hoff III K E. Fast backface culling using normal masks[C]//Proceedings of the 1997 symposium on Interactive 3D graphics. 1997: 103-ff.

[153] Kumar S，Manocha D，Garrett W，et al. Hierarchical back-face computation[J]. Computers & Graphics，1999，23(5): 681-692.

[154] Clark J H. Hierarchical geometric models for visible surface algorithms[J]. Communications of the ACM，1976，19(10): 547-554.

[155] Samet H. The design and analysis of spatial data structures[M]. Reading，MA: Addison-wesley，1990.

[156] Fuchs H，Kedem Z M，Naylor B F. On visible surface generation by a priori tree structures[C]//Proceedings of the 7th annual conference on Computer graphics and interactive techniques. 1980: 124-133.

[157] Slater M，Chrysanthou Y. View volume culling using a probabilistic caching scheme[C]//Proceedings of the ACM symposium on Virtual reality software and technology. 1997: 71-77.

[158] Assarsson U，Moller T. Optimized view frustum culling algorithms for bounding boxes[J]. Journal of graphics tools，2000，5(1): 9-22.

[159] Luebke D，Georges C. Portals and mirrors: Simple，fast evaluation of potentially visible sets[C]//Proceedings of the 1995 symposium on Interactive 3D graphics. 1995: 105-ff.

[160] Bittner J，Wimmer M，Piringer H，et al. Coherent hierarchical culling: Hardware occlusion queries made useful[C]//Computer Graphics Forum. Oxford，UK and Boston，USA: Blackwell Publishing，Inc，2004，23(3): 615-624.