Mathematical Principles for Scientific Computing and Visualization

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A K Peters, 2008

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Figure Filenames for Each Chapter – In Order of Appearance

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Chapter 1: Introduction

1. science.ps
2. shuttle_flow.eps
3. brain.eps

Chapter 2: Computational Basics

1. cancellation1.eps
2. cancellation2.eps
3. patriot.eps

Chapter 3: Coordinate Systems

1. cartesian2D.ps
2. cartesian2D_bold.ps
3. cartesian3d.ps
4. polar_coords.ps
5. sphere_coords.ps
6. world.eps
7. Utm_coords.eps
8. bee_DCH.ps
9. loc_glob.ps
10. homcoords.ps

Chapter 4: Background: Numerical Linear Algebra

1. vec_ops.ps
2. shear_VIZ.ps
3. lin_invariance.ps
4. matmult.ps

Chapter 5: Solving Linear Systems

1. Vectorlimit.ps
2. submarine.eps
3. new_femur.eps

Chapter 6: Eigen-Problems

1. Tacoma.ps
2. Tacoma2.ps
3. Escher_orig.ps
4. Escher_aff.ps
5. power.ps
6. webgraph.eps
7. SVD.ps
8. face1.eps
9. face2.eps
10. face5.eps

Chapter 7: Background: Numerical Calculus

1. funcnofunc.eps
2. linint.ps
3. limits1.eps
4. riserun.ps
5. histogram1.ps
6. histogram2.ps
7. derivex.eps
8. roughderiv.eps
9. comb_cubic.eps
10. problemfunc.eps
11. process.eps

Chapter 8: Data Fitting

1. Taylor.eps
2. pwlinearapprox.eps
3. cubint.ps
4. sqrt_int.eps
5. example_leastp.ps
6. sqrt_approx3.eps
7. sqrt_approx6.eps
8. sqrt_approx10.eps

9. sqrt_approx11.eps
10. outlier1.eps
11. outlier2.eps
12. bspls_uniform.eps
13. bspls_nonuniform.eps
14. splint1.eps
15. splint1a.eps
16. splint2.eps
17. bspleast4.eps
18. bspleast3.eps
19. bspleast3p1.eps
20. trapezrule.eps
21. Simpson.ps
22. samplefct.eps

Chapter 9: Computing Dynamic Processes

1. vecfield.eps
2. vecfield2.eps
3. vecfield3.eps
4. vecfield1.eps
5. euler_step.ps
6. euler10.eps
7. euler30.eps
8. heun10.eps
9. compare_ODE.eps
10. bdy_val.ps
11. katrina-08-28-2005.eps
12. rabfoxfield.eps
13. foxrab.eps
14. Lorenz2.eps
15. Lorenz1.eps

Chapter 10: Finding Roots

1. pw_linear.eps
2. linezero.ps
3. pw_linear_miss.eps
4. Newton.ps
5. Newton1.ps
6. Newton_fails.ps
7. secant.ps
8. find_zeroes.eps

Chapter 11: Computing with Multivariate Functions

1. bi_funct_example.eps
2. bi_funct_example2.eps
3. plane.eps
4. partial.ps
5. function_combo.eps
6. Gradientfield.eps

7. bilinear_domain.ps
8. bilinex.eps
9. threecontours.eps
10. contours.eps
11. contoursshaded.eps
12. density.eps
13. two_functs.eps
14. contour_intersect.eps
15. Newton_sys.ps
16. Laplace_data.eps
17. Laplace_intermed.eps
18. Laplace_sol.eps
19. Laplace_gen.eps
20. Coons.eps
21. Coons_fail.eps
22. contours3D.eps
23. problem_multi.eps

Chapter 12: Visualizing Empirical Data

1. timeseries_wts.eps
2. timeseries_hts.eps
3. scatterplot_wtshts.eps
4. correl.ps
5. scatter_exs.ps
6. scatterplot_dom.eps
7. regline.ps
8. FrenchVillage.eps
9. FV_histogram.eps
10. FrenchVillage_lite.eps
11. FVlite_histogram.eps
12. FrenchVillage_dark.eps
13. FVdark_histogram.eps
14. population_histogram.eps
15. barchart.eps
16. piechart.eps
17. bwplot_densedata.eps
18. bwplot_dense.eps
19. bwplot_biasdata.eps
20. bwplot_bias.eps
21. bwplot_exper.eps
22. noise_power.eps
23. noise_log.eps
24. noise_db.eps
25. nonlogplot.eps
26. logplot.eps

Chapter 13: Facets

1. bary_coords.ps
2. polygons.ps
3. polyhedra.eps
4. buckyball.eps
5. triangs.ps
6. mesh_normal.eps
7. scandavid.eps
8. hair.eps
9. eye.eps
10. flat_curv.eps
11. med_curv.eps
12. hi_curv.eps
13. neg_curv.eps
14. empty_cc.ps
15. points.eps
16. Delaunay.eps
17. voronoi.eps
18. barkbeetle_voronoi.eps
19. pottmann.eps
20. meshes3d.eps

Chapter 14: Visualizing Scalar Values over 2D Data

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2. data2d_mesh.ps
3. meshes.eps
4. meshes_top.eps
5. pointcloud.eps
6. mars.eps
7. mesh_smooth.eps
8. dem_colormap.eps
9. CApercip.eps
10. CAlandslides.eps
11. reflines_principle.ps
12. reflines.ps
13. reflines_transfer.eps
14. grandcanyon_contours.eps
15. bi_funct_example.eps
16. contours_sinx2y2.eps
17. sinx2y2_plane_top025.eps
18. sinx2y2_plane_top09.eps
19. sinx2y2_plane025.eps
20. sinx2y2_plane09.eps
21. density.eps
22. four_cases.ps
23. compcont_x2y2.ps
24. contourxy_negplane.eps
25. contourxy_zeroplane.eps
26. contourxy_posplane.eps
27. contour_connect.ps
28. contours_sinx2y2_smooth.eps
29. contoursshaded.eps
30. mthelens.eps
31. brain.eps
32. edgedetection.eps

Chapter 15: Volume Visualization

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2. Cranialslices.eps
3. bone_vessels.eps
4. delta_vortex.eps
5. mcubes_sphere.eps
6. marchingcubes.eps
7. mcubes_xyz.eps
8. dvr.ps
9. voxel2cell.ps
10. transfer_fct.eps
11. volvis_examples.eps
12. dendrite.eps
13. vmhead-skin.eps
14. visibleman_lung.eps
15. vfemale_skull.eps
16. volvis_sliceplane2.eps
17. volvis_mri4.eps
18. teapot_hedgehog.eps
19. tornado2_sci.eps
20. tornado_sci.eps
21. tornado3_sci.eps
22. tensor_ellipsoid.eps
23. polyp_colon1000pic.eps

Chapter 16: Background: Computer Graphics

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2. hsl_model.ps
3. viewing-camera-setup.ps
4. viewing-camera-eye.ps
5. viewing-ex-world.ps
6. viewing-ex-eye.ps
7. viewing-ex-final.ps
8. ortho-persp.ps
9. frustum_dims.ps
10. mapping_steps.ps
11. projmap_action.ps
12. persp_division.eps
13. rasterization.eps
14. zbuffer.ps
15. phong_geometry.ps
16. stilleben.eps
17. raytracing_reflection.eps
18. raytracing.ps
19. raytracingimplicits.eps
20. gooch98fig11c.eps
21. Haus.eps