## List of figures

Simple, idealized scene of two objects illuminated by a distant point source and homogenous ambient light (left). Discontinuities in the intensity function (right). 15. . . . . . . . . . . .  $10 \times 10$  gray squares of varying intensity (left) and  $256 \times 256$  gray squares of varying intensity (right). The left ima 17A set of data points (top left) and its average. The same points with best fitting linear (top right), quadratic (bottom left), and quartic polynomial (bottom right), respectively. 21(a) Rectangular domain  $\Omega$ . (b) The domain is partitioned into cells  $\{\Omega_i\}$  with centers  $\{x_i\}, i \in I$ . (c) Example partition of  $\Omega$  into six regions. Note that region boundaries always go along cell 30 Test cases 1 to 4 (bottom row) and samples of the corresponding generating images used to gen-52CNR over boundary elements for the test images 1 (upper left) to 4 (lower right) shown in Figure ?. CNR values above 8 are not shown. 53Horizontal cross section through the center of test image four. Dots are gray values, the solid line is a cross section of the graph of the corresponding generating image  $u^g$ , featuring three  $C^1$  discontinuities. 54The value  $F_0(\boldsymbol{u}^{*,i}, 0.001)$  over iterations *i* of the outer loop for test image 3. In the continuation method we minimize with respect to a different objective function  $F_0(., s_i)$  in each iteration, whereas the plot above shows the value of the same objective function  $F_0(., 0.001)$  at all minimizers  $\{u_i^*\}$ . This explains why the value initially increases. 55The constant coefficients of the minimizers  $\{u^{*,i}\}$  (left column), and horizontal cross-sections through the minimizers and z (right column). From top to bottom row the displayed data corresponds to the iterations marked by vertical dashed lines from left to right in Figure ?. The value of the continuation parameter s corresponding to each row is 10, 3.6, 1.3, 0.47, 0.17, 0.061, 0.022, 57Best values in the interval (0, 2) for parameters b and d for the different test images. From each generating image in Figure ?, bottom row, ten test images are created by adding different realizations of the same Gaussian noise process. For each test image the algorithm was run with a large

number of combinations of values for b and d and the parameter value combination from the run producing the largest noise reduction (see text) was recorded in the above plot. Preliminary tests suggested 0.5 as a good value for the embedding parameter f (cf Section 2.5.1), and f = 0.5 was used for all results discussed in this section. 59Results with test-case specific parameter values: a) b = 0.31, d = 0.96, b) b = 0.26, d = 0.16, c) b = 0.41, d = 0.01, d) b = 0.41, d = 0.01, d = 0.0 61 Results similar to Figure ? but with test-case independent parameter values b = 0.42938 and d = 0.5013. The recons 62 Best parameter values for objective function  $F_2$ , see Figure ? for more information. . . . . 63 Result similar to Figure ? for test case 4 with objective function  $F_2$ , b = 2.82, d = 0.36. Note that 64 Development of the quantities  $\|(\nabla F_0(\boldsymbol{u}, s))_{-,k}\|_2/\max(1, \|\boldsymbol{u}_{-,k}\|_2)$  for constant, linear, and quadratic coefficients, respectively, over iterations of the inner-loop in the minimization of objective function  $F_0$  with test case 3. The notation  $u_{-,k}$  denotes the vector consisting of the k-th coeffi-65 Example showing different results for test case 3 obtained with different accuracy of the intermediate solutions con 66 (a) Two regions. (b) Description length  $L_0$  may be reduced when adjacent cells share coefficients. Boundary elements between coefficient-sharing cells are covered with a white diamond. When the worst case description length is corrected for each white diamond, the resulting description length is proportional to the number of coefficients in each region, as well as proportional to the boundary length. 70Ramp image from Leclerc's paper [42] (right),  $C^0$ -discontinuities in reconstruction with difference terms from Section 72Average noise reduction vs. parameter value for an algorithm based on  $F_0$  using Leclerc's embedding described in S 82 Average noise reduction vs. parameter value for algorithms based on Leclerc's objective function  $F_0$  (left column) a 84 Noise reduction vs. parameter d value (b=0.3) for an algorithm based on  $F_0$  with my new embedding. The curve on the left corresponds to (variants of) test case 1, the curve on the right to 85 Average noise reduction vs. parameter value with an algorithm based on  $F_1$  when the generalized embedding depic 87 

12