Supplementary Document for DC-SQEM: Medial Mesh Extraction by Dual Contouring with Spherical Quadric Error Metric

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1 IMPLEMENTATION DETAIL

1.1 T_∞-Type Detection of Cells

T_∞-type nodes are treated as a special edge-like case, mainly used to help complete one-dimensional medial curves. We emphasize that our T_∞ detection is heuristic and is only invoked for non-empty nodes whose number of projection clusters is at least 4. For nodes with fewer projection clusters, we do not perform this detection; instead, their types are determined by the standard Corner/Line/Plane rules based on SQEM singular-value degeneracy and projection grouping constraints.

Intuitively, T_∞ nodes usually appear in locally cylindrical regions (An example see Fig. 1). In such regions, a medial sphere may touch the input surface along a circular or arc-like contact set. After discretization, this structure is reflected by projection directions that are not concentrated around a few isolated directions, but are instead distributed approximately around a ring in the plane orthogonal to some local axis. Therefore, we detect T_∞ nodes by analyzing the angular coverage of projection directions in a local cross-sectional plane.

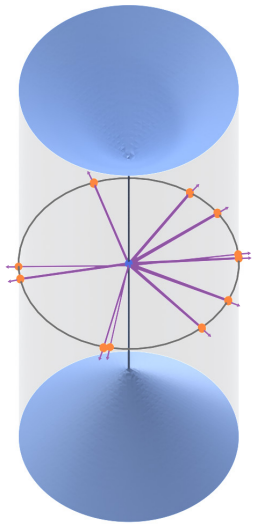


Fig. 1. An example of T_∞-type cell.

Let the set of projection directions inside the current node be

$$\mathcal{D} = \{\mathbf{d}_i\}_{i=1}^{n},$$

where each direction is obtained from the local sample-to-projection direction or the corresponding normal information. Let the projection points in this node be clustered into

$$\mathcal{G} = \{G_1, G_2, \ldots, G_k\}.$$

We only attempt T_∞ detection when $k \geq 4$.

First, we compute a representative direction for each projection cluster. For a cluster G_j, all valid directions in the cluster are normalized and averaged, and the resulting vector is normalized again:

$$\bar{\mathbf{d}}_j = \frac{\sum_{i \in G_j} \mathbf{d}_i / \|\mathbf{d}_i\|}{\left\| \sum_{i \in G_j} \mathbf{d}_i / \|\mathbf{d}_i\| \right\|}.$$

If a cluster contains too few valid directions, or if the averaged direction has near-zero length, this cluster is ignored in the subsequent axis estimation.

Next, we estimate the local cylindrical axis using these cluster representative directions. Let the valid representative directions be

$$\bar{\mathcal{D}} = \{\bar{\mathbf{d}}_j\}_{j=1}^{m}.$$

If fewer than 3 valid representative directions are available, we regard the axis estimation as unstable and directly classify the node as non-T_∞. Otherwise, we perform PCA on these representative directions: after subtracting their mean direction, we compute the covariance matrix, and take the eigenvector associated with the smallest eigenvalue as the estimated axis $\mathbf{a}$. The intuition is that if the directions are approximately distributed on a circular cross section, then the normal of this cross-sectional plane corresponds to the local cylindrical axis.

Given the estimated axis $\mathbf{a}$, we project all valid original directions onto the plane orthogonal to $\mathbf{a}$. For each direction $\mathbf{d}_i$, its projection is

$$\mathbf{q}_i = \mathbf{d}_i - (\mathbf{d}_i \cdot \mathbf{a})\mathbf{a}.$$

If the projection length is too small, the direction is nearly parallel to the axis and does not reliably indicate the angular distribution in the cross-sectional plane. Such directions are filtered out using a minimum projection-length threshold. If the number of remaining valid projected directions is still no smaller than the minimum group threshold, these directions are used for angular coverage analysis; otherwise, if there are still enough valid directions, we fall back to using all non-zero projected directions.

We then build a local orthonormal basis on the plane orthogonal to $\mathbf{a}$, and convert each valid projected direction into a planar angle $\theta_i \in [0, 2\pi)$. After sorting all angles, we compute the maximum circular gap between consecutive angles, including the wrap-around gap between the last and first angles. Let this maximum gap be $\Delta_{\max}$. If $\Delta_{\max} < \theta_{\text{gap}}$, we consider the directions to sufficiently cover the cross section, and classify the current node as T_∞. In our experiments, we use the default threshold $\theta_{\text{gap}} = 100°$. If the maximum angular gap is too large, the directions only cover a local sector rather than an approximately circular distribution, and the node is not classified as T_∞.

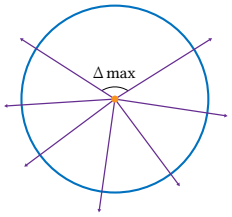


Fig. 2. The maximum circular gap between consecutive angles, including the wrap-around gap between the last and first angles.

Once a node is classified as T_∞, it is forced to be treated as a Line-type during SQEM solving. In other words, we do not treat it as a higher-order Corner type; instead, we use a line-type solution space for candidate dual-point generation and for completing one-dimensional medial branches.

We emphasize that this T_∞ detection is not a theoretically guaranteed classification algorithm, but rather a heuristic designed for locally cylindrical structures. It depends on projection grouping, axis estimation, and angular coverage thresholds, and may therefore produce false positives or false negatives in complex tubular regions, noisy point clouds, or undersampled inputs. The main paper discusses representative failure cases in the limitation section.

1.2 SQEM-based Solution and Cell Type Downgrading

This section provides additional implementation details for the SQEM-based dual-point solving procedure described in Sec. 3.2, 3.3 and 3.4 in the main paper. The full workflow is summarized in Fig. 3. We include this detailed diagram in the supplementary material because the actual implementation involves several practical decisions, including rank bounding by projection groups, neighborhood search, and type downgrading. These details are useful for reproducibility, but would make the main text unnecessarily complex.

Given a non-label non-empty octree node, we first build an SQEM system from its local projection constraints and compute the singular values of the corresponding least-squares system. The singular-value degeneracy provides an initial estimate of the intrinsic dimension of the local solution space. However, directly deciding the type only from singular values is unstable in practice, since the effective rank can be sensitive to the numerical threshold and local sampling noise. Therefore, we further use the number of projection groups as an upper bound on the number of effective non-zero singular values. This gives a conservative combination rule: if the singular-value analysis suggests a more complex type than the projection groups support, we downgrade the current SQEM type accordingly. In our implementation, the possible types are Corner, Line, and Plane; detected T_∞ nodes are treated as Line-like cases.

Once the current type is determined, we generate a candidate dual point according to the corresponding solution space. For a Corner type, we directly use the SQEM minimizer. For an Edge type, we intersect the SQEM line with the cell box and take the midpoint of the valid intersection segment. For a Plane type, we intersect the SQEM plane with the cell box and use the centroid of the intersection polygon.

If the candidate dual point lies inside the current cell, we accept it as the dual point of this node. Otherwise, we search for a valid intersection in the local neighborhood. We first search face-adjacent nodes, whose grid coordinates differ by exactly one unit in one coordinate. If no valid intersection is found, we further search edge-adjacent nodes, whose grid coordinates differ by one unit in two coordinates. When a valid intersection is found in a neighboring cell, the current node is marked as a candidate virtual node and later resolved through the virtual-node construction described in the main paper.

If no valid candidate can be obtained for the current type, we downgrade the SQEM type and repeat the candidate generation and neighborhood search. The downgrade order is

$$\text{Corner} \rightarrow \text{Line} \rightarrow \text{Plane}.$$

This multi-stage solving strategy is designed to recover from overly complex type estimates caused by noisy singular values or over-segmented projection groups. If all lower-dimensional alternatives fail, the node is marked as empty and does not participate in the subsequent dual contouring stage.

2 Detailed Quantitative Results for CAD and Organic Models

To provide full transparency of our evaluation, we include detailed statistics for each input model in the CAD and organic shape datasets. Tables 1-3 present results for selected sets of input files. Each table includes the following metrics for each method: Hausdorff distance (ϵ^1 and ϵ^2), Euler characteristic (χ), and number of connected components (b_0).

Other metrics, such as Topological Error Rate (TER) or Triangle Quality (TQ), are not included in these tables due to page width limitations. Because we compare multiple methods, each long table contains only 3–5 methods for clarity, with one table per subset of inputs. The full dataset is divided across several long tables to accommodate the large number of inputs and methods.

These tables complement Tables 2 and 3 in the main paper, which summarize aggregate statistics across the CAD and organic datasets.

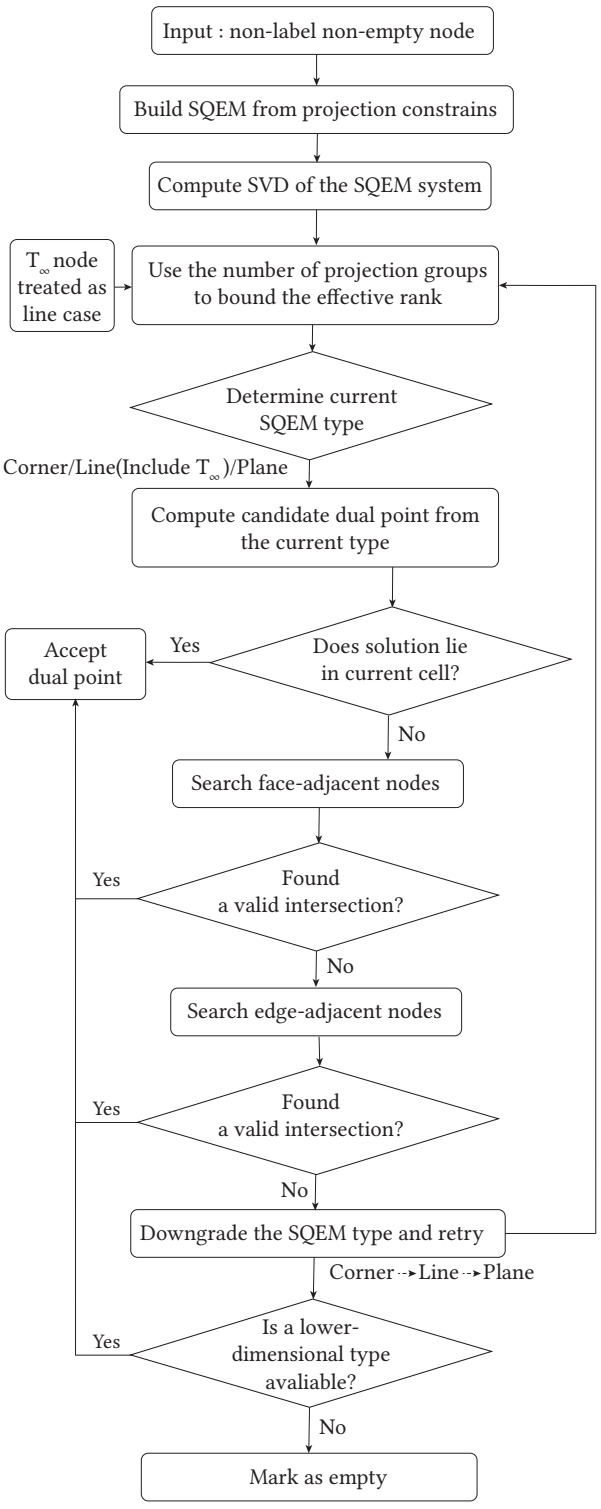


Fig. 3. Detailed SQEM-based dual-point solving workflow for non-label non-empty nodes. It shows the main solving procedure, including SQEM construction, singular-value analysis, rank bounding by projection groups, candidate generation, neighborhood search, type downgrading, and empty-node rejection.

Table 1. Detailed quantitative results for the CAD dataset: Hausdorff distances (ϵ^1, ϵ^2), Euler characteristic (χ), and number of connected components (b_0) for each input file and selected methods.Best values are shown in **bold**.

Model	OURS				MATSTRUCT				MATFP				MATTOPO			
Param	ϵ^1	ϵ^2	χ	b_0	ϵ^1	ϵ^2	χ	b_0	ϵ^1	ϵ^2	χ	b_0	ϵ^1	ϵ^2	χ	b_0
40049	0.25	0.18	**0**	**1**	0.39	0.32	**0**	**1**	0.68	0.51	**0**	**1**	0.68	1.14	**0**	**1**
40051	0.25	0.22	**0**	**1**	2.19	1.66	**0**	**1**	0.92	0.65	1	**1**	2.49	1.70	**0**	**1**
40052	0.35	0.24	**0**	**1**	0.45	0.33	**0**	**1**	1.73	1.23	**0**	**1**	0.34	0.24	**0**	**1**
40053	**0.35**	0.25	**0**	**1**	1.57	1.10	**0**	**1**	0.96	0.90	2	**1**	1.01	0.95	**0**	**1**
40057	**0.19**	**0.14**	**-8**	**1**	0.32	0.32	**-8**	**1**	0.38	0.32	-5	**1**	0.40	0.34	**-8**	**1**
40073	0.40	0.29	**1**	**1**	1.45	1.10	**1**	**1**	3.01	2.87	**1**	**1**	3.17	3.02	**1**	**1**
40085	**0.36**	**0.20**	**-1**	**1**	-	-	-	-	0.43	0.49	1	**1**	0.45	0.51	**-1**	**1**
40092	0.74	0.74	**1**	**1**	0.82	0.82	**1**	**1**	0.48	0.34	**1**	**1**	0.51	0.36	**1**	**1**
40093	**0.18**	**0.13**	**1**	**1**	0.22	0.25	**1**	**1**	0.36	0.29	**1**	**1**	0.37	0.31	**1**	**1**
40096	0.45	0.44	**1**	**1**	2.32	2.20	**1**	**1**	0.65	0.60	**1**	**1**	0.68	0.63	**1**	**1**
40097	0.33	0.25	-2	**1**	0.51	0.50	**1**	**1**	0.42	0.66	-1	**1**	0.44	0.69	**1**	**1**
40108	**0.30**	0.39	**1**	**1**	2.93	2.14	**1**	**1**	2.19	3.02	104	104	2.30	3.18	**1**	**1**
40110	0.28	0.27	**1**	**1**	0.63	0.59	**1**	**1**	0.36	0.33	**1**	**1**	0.38	0.35	**1**	**1**
40119	0.17	0.14	**1**	**1**	**0.17**	**0.13**	**1**	**1**	0.22	0.16	**1**	**1**	0.23	0.17	**1**	**1**
40123	0.28	**0.20**	**1**	**1**	0.91	0.88	**1**	**1**	0.71	0.79	4	**1**	0.75	0.83	**1**	**1**
40144	1.29	0.39	**-1**	**1**	1.24	0.42	**-1**	**1**	0.34	**0.15**	**-1**	**1**	0.36	0.15	**-1**	**1**
40145	0.29	0.22	**0**	**1**	-	-	-	-	0.78	0.85	4	**1**	0.82	0.90	**0**	**1**
40149	4.80	4.80	**1**	**1**	1.13	1.12	**1**	**1**	0.45	0.45	**1**	**1**	0.47	0.47	**1**	**1**
40177	**0.29**	**0.19**	**1**	**1**	2.62	2.04	**1**	**1**	0.83	0.69	**1**	**1**	0.88	0.73	**1**	**1**
40180	0.32	0.22	**1**	**1**	0.61	0.65	**1**	**1**	0.80	0.71	**1**	**1**	0.84	0.75	**1**	**1**
40190	0.68	0.68	**1**	**1**	3.82	3.43	**1**	**1**	7.35	9.79	2	2	7.74	10.30	**1**	**1**
40193	0.22	0.17	**0**	**1**	0.96	0.90	**0**	**1**	0.71	0.58	1	**1**	0.75	0.61	**0**	**1**
40208	0.38	0.38	**1**	**1**	1.40	1.34	**1**	**1**	1.30	1.53	8	**1**	1.37	1.61	**1**	**1**
40225	0.24	**0.15**	**1**	**1**	0.50	0.47	**1**	**1**	**0.05**	0.35	**1**	**1**	0.05	0.37	**1**	**1**
40270	0.46	0.35	**0**	**1**	1.19	0.88	**0**	**1**	1.00	0.79	12	**1**	1.05	0.83	**0**	**1**
40271	0.34	0.35	**1**	**1**	2.13	1.96	**1**	**1**	8.42	10.23	2	2	8.86	10.77	**1**	**1**
40274	**0.30**	0.25	**0**	**1**	0.59	0.45	**0**	**1**	0.74	0.70	1	**1**	0.78	0.74	**0**	**1**
40275	0.33	0.26	**0**	**1**	0.70	0.58	**0**	**1**	**0.18**	0.79	**0**	**1**	0.19	0.83	**0**	**1**
40276	**0.18**	**0.13**	**0**	**1**	0.24	0.27	**0**	**1**	0.30	0.38	**0**	**1**	0.31	0.40	**0**	**1**
40278	0.40	0.40	**1**	**1**	7.49	5.87	**1**	**1**	5.97	8.44	**1**	**1**	6.29	8.88	**1**	**1**
40313	0.28	0.19	**0**	**1**	0.79	0.48	**0**	**1**	1.00	0.94	**0**	**1**	1.05	0.99	**0**	**1**
40327	**0.30**	0.26	**0**	**1**	0.43	0.44	**0**	**1**	0.42	0.66	2	**1**	0.44	0.69	**0**	**1**
40345	**0.20**	0.20	**1**	**1**	9.33	6.76	**1**	**1**	6.75	5.15	10	**1**	7.10	5.42	**1**	**1**
40361	0.39	0.35	**1**	**1**	0.61	0.61	**1**	**1**	0.41	0.36	**1**	**1**	0.43	0.38	**1**	**1**
40365	1.04	0.25	-1	**1**	1.18	0.87	**1**	**1**	**0.60**	1.11	2	**1**	0.64	1.17	**1**	**1**
40381	**0.27**	**0.17**	**1**	**1**	0.46	0.34	**1**	**1**	0.44	0.46	**1**	**1**	0.46	0.48	**1**	**1**
40390	1.39	1.39	**1**	**1**	1.77	1.80	**1**	**1**	**0.41**	**0.34**	**1**	**1**	0.43	0.36	**1**	**1**
40401	**0.26**	**0.18**	**1**	**1**	0.48	0.33	**1**	**1**	0.47	0.39	**1**	**1**	0.49	0.41	**1**	**1**
40431	0.24	0.17	**1**	**1**	0.76	0.79	**1**	**1**	1.87	1.40	4	**1**	1.13	0.91	**1**	**1**
40478	0.21	0.21	**0**	**1**	1.19	1.06	**0**	**1**	0.39	0.34	**0**	**1**	0.41	0.36	**0**	**1**
40525	0.43	0.42	**-4**	**1**	1.97	1.37	**-4**	**1**	**0.14**	0.79	-3	**1**	0.14	0.83	**-4**	**1**
40563	0.34	0.43	**1**	**1**	0.65	0.65	**1**	**1**	0.71	0.67	**1**	**1**	0.75	0.70	**1**	**1**
40566	0.23	0.21	**1**	**1**	0.61	0.61	**1**	**1**	0.55	0.82	**1**	**1**	0.58	0.86	**1**	**1**
40574	0.35	0.19	**1**	**1**	0.32	0.18	**1**	**1**	-	-	-	-	**0.18**	**0.18**	**1**	**1**
40578	**0.20**	0.15	**0**	**1**	0.36	0.34	**0**	**1**	0.96	0.71	**0**	**1**	1.01	0.74	**0**	**1**
40582	0.25	0.22	**-6**	**1**	0.57	0.56	**-6**	**1**	0.95	0.91	**-6**	**1**	1.00	0.95	**-6**	**1**
40640	**0.20**	**0.11**	**-2**	**1**	0.48	0.46	**-2**	**1**	0.37	0.26	**-2**	**1**	0.39	0.28	**-2**	**1**
40719	**0.30**	0.21	**0**	**1**	0.77	0.56	**0**	**1**	0.58	0.90	6	**1**	0.61	0.95	**0**	**1**
40720	1.92	1.92	**1**	**1**	2.33	2.33	**1**	**1**	**0.52**	**0.81**	2	2	0.55	0.85	**1**	**1**

40743	0.58	0.62	**1**	**1**	1.60	1.53	**1**	**1**	1.48	2.66	**1**	**1**	1.56	2.79	**1**	**1**
40757	0.83	**0.30**	**1**	**1**	2.05	1.43	**1**	**1**	1.90	3.07	0	**1**	2.00	3.23	**1**	**1**
40780	0.44	0.26	**0**	**1**	0.92	0.85	**0**	**1**	0.70	0.63	6	**1**	0.74	0.67	**0**	**1**
40790	0.21	**0.15**	**-3**	**1**	0.21	0.21	**-3**	**1**	**0.09**	0.21	**-3**	**1**	0.09	0.22	**-3**	**1**
40850	0.29	0.21	**0**	**1**	0.59	0.45	**0**	**1**	0.43	0.39	-2	**1**	0.46	0.41	**0**	**1**
40860	**0.17**	**0.13**	**1**	**1**	0.18	0.14	**1**	**1**	0.28	0.22	**1**	**1**	0.30	0.23	**1**	**1**
40861	0.47	0.33	**1**	**1**	0.46	0.37	**1**	**1**	**0.40**	0.30	**1**	**1**	0.42	0.31	**1**	**1**
40884	**0.20**	**0.14**	**1**	**1**	0.86	0.86	**1**	**1**	0.97	0.77	**1**	**1**	1.02	0.81	**1**	**1**
40950	**0.25**	**0.16**	**-1**	**1**	0.29	0.17	**-1**	**1**	0.35	0.33	**-1**	**1**	0.37	0.35	**-1**	**1**
40988	0.35	0.34	**1**	**1**	2.17	2.02	**1**	**1**	8.51	10.03	2	2	8.95	10.56	**1**	**1**
41118	0.71	0.70	**1**	**1**	1.39	1.02	**1**	**1**	0.57	1.02	3	3	0.60	1.07	**1**	**1**
41119	0.29	**0.11**	**1**	**1**	-	-	-	-	0.86	0.51	**1**	**1**	0.90	0.54	**1**	**1**
41169	0.51	0.51	**1**	**1**	1.21	1.22	**1**	**1**	**0.49**	0.61	**1**	**1**	0.52	0.64	**1**	**1**
41188	0.26	0.21	**0**	**1**	0.88	0.86	**0**	**1**	0.49	0.66	**0**	**1**	0.52	0.69	**0**	**1**
41225	0.27	**0.19**	**-2**	**1**	0.61	0.53	**-2**	**1**	**0.19**	0.84	**-2**	**1**	0.20	0.89	**-2**	**1**
41266	**0.25**	**0.18**	**0**	**1**	-	-	-	-	1.15	1.04	**0**	**1**	1.22	1.10	**0**	**1**
41275	0.21	0.16	**0**	**1**	**0.17**	**0.13**	**0**	**1**	0.33	0.28	**0**	**1**	0.35	0.29	**0**	**1**
41305	0.22	0.13	**1**	**1**	0.49	0.49	**1**	**1**	0.91	0.98	**1**	**1**	0.96	1.03	**1**	**1**
41334	0.49	0.35	**1**	**1**	0.82	0.80	**1**	**1**	0.35	0.38	2	**1**	0.37	0.40	**1**	**1**
41550	0.26	**0.16**	**1**	**1**	**0.22**	0.22	**1**	**1**	0.31	0.33	**1**	**1**	0.33	0.35	**1**	**1**
41772	0.43	0.28	**1**	**1**	1.78	1.55	**1**	**1**	0.49	0.48	2	**1**	0.52	0.50	**1**	**1**
41774	0.62	0.62	**1**	**1**	1.24	1.27	**1**	**1**	0.61	0.98	4	**1**	0.65	1.03	**1**	**1**
41839	**0.20**	**0.14**	**-4**	**1**	0.53	0.35	**-4**	**1**	0.26	0.33	**-4**	**1**	0.28	0.35	**-4**	**1**
41859	**0.23**	**0.23**	**0**	**1**	0.54	0.47	**0**	**1**	0.51	0.47	**0**	**1**	0.54	0.49	**0**	**1**
41984	0.41	0.38	**1**	**1**	1.36	1.32	**1**	**1**	**0.12**	0.43	2	2	0.12	0.46	**1**	**1**
42020	0.26	**0.16**	**-1**	**1**	0.47	0.41	**-1**	**1**	0.24	0.36	1	**1**	0.25	0.38	**-1**	**1**
42185	0.23	0.17	**1**	**1**	0.96	0.73	**1**	**1**	0.91	0.99	2	**1**	0.96	1.04	**1**	**1**
42242	0.55	0.51	**1**	**1**	1.85	1.76	**1**	**1**	0.35	0.29	**1**	**1**	0.37	0.30	**1**	**1**
42394	**0.23**	0.23	**0**	**1**	0.91	0.93	**0**	**1**	0.27	0.90	**0**	**1**	0.29	0.95	**0**	**1**
42511	**0.38**	0.26	**0**	**1**	0.52	0.53	**0**	**1**	0.40	0.35	**0**	**1**	0.42	0.37	**0**	**1**
42845	0.23	0.18	**1**	**1**	0.80	0.74	**1**	**1**	0.50	0.50	2	**1**	0.53	0.52	**1**	**1**
42950	**0.23**	0.17	**0**	**1**	0.68	0.69	**0**	**1**	1.18	1.10	**0**	**1**	1.24	1.16	**0**	**1**
43248	0.33	0.25	**0**	**1**	0.75	0.53	**0**	**1**	0.36	0.76	1	**1**	0.38	0.80	**0**	**1**
43413	0.29	**0.16**	**0**	**1**	0.39	0.32	**0**	**1**	**0.18**	0.71	**0**	**1**	0.19	0.75	**0**	**1**
43535	**0.21**	**0.15**	**-1**	**1**	0.25	0.17	**-1**	**1**	0.33	0.40	**-1**	**1**	0.35	0.42	**-1**	**1**
43588	0.36	0.25	**1**	**1**	0.71	0.49	**1**	**1**	0.47	0.50	0	**1**	0.49	0.53	**1**	**1**
44709	0.19	**0.13**	**1**	**1**	0.21	0.16	**1**	**1**	**0.17**	0.18	**1**	**1**	0.17	0.19	**1**	**1**
45127	0.30	0.21	**1**	**1**	0.66	0.60	**1**	**1**	0.62	0.96	8	**1**	0.66	1.01	**1**	**1**
45548	0.18	0.13	**0**	**1**	0.17	**0.13**	**0**	**1**	**0.06**	0.14	**0**	**1**	0.06	0.14	**0**	**1**
46146	**0.18**	**0.12**	**-1**	**1**	0.47	0.57	**-1**	**1**	0.23	0.39	**-1**	**1**	0.24	0.41	**-1**	**1**
46533	**0.28**	**0.20**	**0**	**1**	1.21	1.08	**0**	**1**	0.38	0.28	**0**	**1**	0.40	0.29	**0**	**1**
46706	**0.44**	0.43	**-1**	**1**	0.65	0.67	**-1**	**1**	0.99	0.80	**-1**	**1**	1.04	0.84	**-1**	**1**
46889	0.26	0.19	**0**	**1**	0.82	0.76	**0**	**1**	0.70	0.75	**0**	**1**	0.74	0.79	**0**	**1**
47054	0.40	0.28	**1**	**1**	0.56	0.40	**1**	**1**	0.59	0.53	**1**	**1**	0.62	0.56	**1**	**1**

Model	PC-160				PC-200				SAT-0.03				SAT-0.04			
Param	ϵ^1	ϵ^2	χ	b_0	ϵ^1	ϵ^2	χ	b_0	ϵ^1	ϵ^2	χ	b_0	ϵ^1	ϵ^2	χ	b_0
40049	0.29	0.21	211k	**1**	**0.23**	**0.15**	332k	**1**	2.57	3.69	50	**1**	4.92	3.77	44	**1**
40051	0.26	0.21	70k	**1**	**0.23**	**0.14**	110k	**1**	3.77	4.13	22	2	2.66	6.17	22	3
40052	2.60	0.27	21k	**1**	**0.33**	**0.22**	32k	**1**	2.20	5.27	9	**1**	3.24	3.94	10	**1**
40053	1.95	0.26	68k	**1**	2.00	**0.19**	107k	**1**	5.24	4.82	38	**1**	3.12	4.23	22	**1**
40057	2.05	0.24	36k	**1**	0.23	0.17	57k	**1**	-	-	-	-	1.98	5.95	-5	2
40073	0.30	0.27	64k	**1**	**0.27**	**0.21**	104k	**1**	3.88	4.60	13	4	2.82	2.95	13	9

40085	0.99	0.24	61k	**1**	1.03	0.21	96k	**1**	6.36	6.19	16	**1**	6.29	5.74	9	**1**
40092	0.39	0.29	128k	**1**	**0.25**	**0.18**	204k	**1**	2.33	1.87	16	**1**	3.76	3.21	8	**1**
40093	0.30	0.20	212k	**1**	0.25	0.16	333k	**1**	5.64	4.41	67	**1**	5.50	3.88	48	**1**
40096	0.27	0.20	112k	**1**	**0.18**	**0.16**	179k	**1**	4.74	4.53	9	**1**	2.79	1.99	6	**1**
40097	0.35	0.70	116k	**1**	**0.29**	**0.15**	182k	**1**	1.81	2.99	30	**1**	5.31	5.53	28	**1**
40108	1.02	0.25	87k	**1**	1.07	**0.17**	151k	**1**	6.41	6.60	108	59	3.83	7.15	56	43
40110	0.29	0.20	93k	**1**	**0.20**	**0.15**	146k	**1**	2.66	2.39	23	**1**	1.91	1.80	15	**1**
40119	0.26	0.22	83k	**1**	0.23	0.19	131k	**1**	2.49	3.76	15	**1**	2.05	1.75	22	**1**
40123	0.35	0.29	64k	**1**	**0.26**	0.24	100k	**1**	3.11	2.32	32	**1**	4.87	4.21	20	**1**
40144	0.34	0.27	25k	**1**	**0.31**	0.21	40k	**1**	3.59	7.31	9	**1**	4.18	4.14	8	2
40145	0.35	0.28	93k	**1**	**0.27**	**0.21**	146k	**1**	5.72	4.24	37	**1**	7.89	5.10	23	**1**
40149	0.34	0.24	49k	**1**	**0.30**	**0.18**	79k	**1**	1.49	1.19	19	**1**	2.71	1.98	11	**1**
40177	1.80	0.25	106k	**1**	1.59	0.19	166k	**1**	6.95	5.34	39	**1**	7.31	6.83	29	**1**
40180	1.05	0.26	111k	**1**	**0.25**	**0.17**	174k	**1**	7.51	6.05	46	**1**	5.78	4.94	25	**1**
40190	0.28	0.21	117k	**1**	**0.21**	**0.16**	182k	**1**	4.45	4.18	14	**1**	4.97	4.66	13	**1**
40193	0.21	**0.17**	163k	**1**	**0.16**	0.17	258k	**1**	2.12	3.31	68	**1**	3.00	3.76	33	**1**
40208	0.20	0.15	265k	**1**	**0.17**	**0.14**	416k	**1**	2.96	4.69	30	**1**	2.01	2.02	22	**1**
40225	0.24	0.21	56k	**1**	0.23	0.18	87k	**1**	2.41	5.47	30	**1**	3.25	3.84	37	**1**
40270	0.31	0.25	147k	**1**	**0.25**	**0.19**	231k	**1**	5.17	4.13	44	**1**	5.28	3.51	39	**1**
40271	0.36	0.26	100k	**1**	**0.21**	**0.15**	161k	**1**	3.32	3.85	35	**1**	2.96	3.95	15	**1**
40274	0.37	0.26	53k	**1**	0.31	**0.23**	84k	**1**	4.34	5.90	13	**1**	4.90	4.65	9	**1**
40275	0.30	0.25	76k	**1**	0.24	**0.17**	119k	**1**	3.15	5.47	30	**1**	4.22	4.27	8	**1**
40276	0.28	0.21	143k	**1**	0.19	0.15	224k	**1**	1.62	1.81	32	**1**	1.91	1.96	22	**1**
40278	0.32	0.25	102k	**1**	**0.23**	**0.17**	166k	**1**	3.42	2.49	21	**1**	2.95	4.79	15	2
40313	0.24	0.17	240k	**1**	**0.21**	**0.13**	379k	**1**	3.56	3.79	56	**1**	4.30	5.39	48	**1**
40327	2.42	1.95	93k	**1**	2.38	**0.17**	148k	**1**	2.21	6.78	32	**1**	3.33	2.88	5	**1**
40345	0.22	**0.19**	159k	**1**	-	-	-	-	3.67	3.63	46	**1**	3.81	4.10	18	**1**
40361	0.39	0.27	64k	**1**	**0.29**	**0.23**	101k	**1**	3.87	4.01	32	2	3.45	4.44	18	2
40365	1.64	**0.23**	173k	**1**	1.69	0.55	272k	**1**	3.49	2.59	36	**1**	5.54	4.24	29	**1**
40381	0.38	0.29	35k	**1**	0.29	0.23	56k	**1**	3.17	5.82	6	**1**	5.16	4.64	6	**1**
40390	1.38	17.93	213k	**1**	0.72	11.79	290k	**1**	6.98	4.81	63	12	5.42	7.26	38	5
40401	0.30	0.22	39k	**1**	0.29	0.18	61k	**1**	-	-	-	-	2.87	5.49	5	**1**
40431	0.30	0.21	155k	**1**	**0.21**	**0.17**	243k	**1**	-	-	-	-	-	-	-	-
40478	0.26	0.21	129k	**1**	**0.19**	**0.13**	202k	**1**	2.19	3.15	35	**1**	1.90	2.85	21	**1**
40525	0.33	0.22	101k	**1**	0.21	**0.15**	159k	**1**	1.52	4.08	8	**1**	3.27	4.80	6	**1**
40563	0.18	0.16	270k	**1**	**0.16**	**0.14**	428k	**1**	2.71	2.16	67	**1**	2.44	1.80	38	**1**
40566	0.26	0.21	116k	**1**	**0.21**	**0.17**	184k	**1**	6.10	4.04	32	**1**	4.44	5.63	21	**1**
40574	0.37	0.29	48k	**1**	0.30	0.22	75k	**1**	3.15	3.07	19	**1**	2.28	1.65	21	**1**
40578	0.23	0.16	191k	**1**	0.23	**0.14**	303k	**1**	3.00	2.44	50	**1**	3.00	6.01	44	**1**
40582	0.30	0.19	187k	**1**	**0.20**	**0.15**	298k	**1**	3.89	3.61	52	**1**	3.84	4.39	35	**1**
40640	1.41	0.16	208k	**1**	1.43	0.13	334k	**1**	4.96	4.15	63	**1**	4.61	3.76	43	**1**
40719	0.31	0.24	99k	**1**	0.48	**0.20**	155k	**1**	5.57	3.43	37	**1**	4.21	3.13	26	**1**
40720	0.72	15.51	72k	**1**	0.74	15.46	111k	**1**	-	-	-	-	4.16	9.57	18	2
40743	0.26	0.18	148k	**1**	**0.22**	**0.16**	233k	**1**	3.26	3.02	32	**1**	5.22	3.92	21	**1**
40757	0.34	12.59	91k	**1**	**0.28**	12.58	143k	**1**	7.16	8.93	43	8	7.21	3.63	24	8
40780	0.39	0.23	161k	**1**	**0.32**	**0.16**	252k	**1**	6.98	4.04	93	**1**	5.17	5.55	72	**1**
40790	1.94	0.23	38k	**1**	1.94	0.20	60k	**1**	6.07	7.66	0	**1**	4.55	7.27	0	2
40850	0.30	0.22	46k	**1**	**0.22**	**0.20**	73k	**1**	2.16	2.82	11	**1**	3.65	5.03	9	**1**
40860	3.80	0.24	58k	**1**	3.68	0.18	91k	**1**	2.60	2.55	26	**1**	2.30	2.43	15	**1**
40861	1.46	0.27	21k	**1**	3.14	**0.25**	33k	**1**	2.52	1.87	10	**1**	3.64	3.51	10	**1**
40884	0.28	0.22	111k	**1**	0.23	0.19	174k	**1**	2.69	1.93	22	**1**	4.29	3.18	22	**1**
40950	0.32	0.25	76k	**1**	0.28	0.20	119k	**1**	2.37	4.21	22	**1**	7.87	6.27	15	**1**
40988	0.28	0.23	100k	**1**	**0.25**	**0.16**	161k	**1**	3.10	3.76	35	**1**	2.88	4.50	9	**1**

41118	0.33	0.18	135k	**1**	**0.27**	**0.13**	212k	**1**	1.59	3.24	31	**1**	2.47	4.86	17	**1**
41119	0.34	0.18	196k	**1**	**0.27**	0.13	310k	**1**	3.89	4.68	38	**1**	3.46	3.35	24	**1**
41169	2.69	**0.23**	52k	**1**	2.70	0.24	84k	**1**	2.79	2.98	20	**1**	3.33	3.52	16	**1**
41188	0.28	0.22	109k	**1**	**0.23**	**0.17**	171k	**1**	3.08	3.92	33	**1**	2.51	3.80	16	**1**
41225	0.28	0.22	114k	**1**	0.22	0.21	181k	**1**	3.53	3.62	19	**1**	4.54	6.07	9	**1**
41266	0.31	0.24	120k	**1**	0.26	0.20	187k	**1**	5.33	4.05	35	**1**	5.91	3.89	25	**1**
41275	0.29	0.20	166k	**1**	0.23	0.16	262k	**1**	4.45	3.85	40	**1**	6.01	4.96	20	**1**
41305	0.23	0.16	279k	**1**	**0.15**	**0.11**	440k	**1**	1.43	1.83	42	**1**	2.40	1.93	24	**1**
41334	0.37	0.27	22k	**1**	**0.30**	**0.27**	34k	**1**	4.45	4.33	21	**1**	3.19	3.97	13	**1**
41550	0.29	0.19	114k	**1**	0.25	0.17	179k	**1**	2.89	2.34	30	**1**	4.76	4.38	20	**1**
41772	0.40	0.29	49k	**1**	**0.30**	**0.24**	77k	**1**	7.24	6.27	20	**1**	5.95	5.14	22	**1**
41774	**0.29**	0.22	152k	**1**	1.37	**0.15**	238k	**1**	3.57	4.79	15	**1**	2.48	3.64	22	3
41839	0.73	0.16	363k	**1**	0.66	0.14	569k	**1**	5.37	4.15	30	**1**	4.64	3.11	18	**1**
41859	1.12	0.24	102k	**1**	0.30	0.49	159k	**1**	1.85	5.06	8	**1**	2.25	5.13	6	**1**
41984	0.32	0.26	76k	**1**	6.66	**0.16**	118k	**1**	3.07	2.41	57	**1**	2.85	2.03	32	**1**
42020	0.35	0.25	85k	**1**	**0.23**	0.20	133k	**1**	4.93	3.93	19	**1**	4.91	5.74	16	**1**
42185	0.27	0.17	182k	**1**	**0.21**	**0.14**	285k	**1**	5.63	3.77	53	**1**	7.58	5.40	38	**1**
42242	0.38	0.27	76k	**1**	**0.28**	**0.18**	121k	**1**	2.00	1.90	37	**1**	2.14	1.77	22	**1**
42394	0.26	**0.17**	197k	**1**	0.25	3.48	310k	**1**	1.64	4.89	30	**1**	2.65	3.14	16	**1**
42511	7.92	0.31	30k	**1**	8.01	**0.23**	47k	**1**	6.26	5.85	16	**1**	4.91	5.01	10	**1**
42845	0.26	0.19	56k	**1**	**0.22**	**0.18**	89k	**1**	1.79	5.35	27	**1**	3.28	3.85	16	**1**
42950	0.27	0.20	157k	**1**	0.23	**0.15**	247k	**1**	7.06	8.54	38	**1**	3.78	4.00	26	**1**
43248	0.35	0.28	53k	**1**	**0.30**	**0.21**	84k	**1**	4.02	3.67	14	**1**	6.81	5.20	1	**1**
43413	0.34	0.24	73k	**1**	0.27	0.20	115k	**1**	3.21	4.13	37	**1**	4.02	3.23	23	**1**
43535	2.03	0.27	111k	**1**	1.78	0.20	175k	**1**	4.34	6.10	92	**1**	5.59	8.40	**-1**	**1**
43588	0.36	0.38	38k	**1**	**0.33**	**0.24**	59k	**1**	4.00	4.07	14	**1**	3.60	5.39	11	**1**
44709	0.31	0.22	66k	**1**	0.22	0.18	104k	**1**	1.89	1.60	24	**1**	2.80	2.52	17	**1**
45127	0.28	0.22	141k	**1**	**0.24**	**0.17**	220k	**1**	3.61	2.67	51	**1**	6.55	4.27	29	**1**
45548	1.48	0.21	56k	**1**	0.55	0.17	89k	**1**	1.52	2.73	5	**1**	2.49	6.85	4	**1**
46146	2.14	0.22	95k	**1**	1.91	0.16	149k	**1**	3.31	2.49	28	**1**	3.61	3.42	24	**1**
46533	0.37	0.30	44k	**1**	0.34	0.23	69k	**1**	4.25	3.60	27	**1**	2.26	2.01	18	**1**
46706	2.50	0.31	80k	**1**	2.51	**0.21**	128k	**1**	7.03	6.83	20	**1**	5.79	6.64	20	**1**
46889	0.21	**0.15**	160k	**1**	**0.18**	0.15	256k	**1**	3.48	3.33	66	**1**	4.17	5.41	49	**1**
47054	0.36	0.28	32k	**1**	**0.32**	**0.23**	51k	**1**	3.05	6.01	31	**1**	5.62	5.59	15	**1**

Table 2. Detailed quantitative results for the CAD dataset (continued).

Model	VMAS				VC				NSK			
Param	ϵ^1	ϵ^2	χ	b_0	ϵ^1	ϵ^2	χ	b_0	ϵ^1	ϵ^2	χ	b_0
40049	1.84	1.33	266	**1**	1.30	0.63	**0**	**1**	-	-	2.3k	**1**
40051	1.48	2.01	106	**1**	0.78	0.56	**0**	**1**	-	-	2.7k	**1**
40052	0.80	0.56	135	**1**	1.34	0.77	**0**	**1**	-	-	9	3
40053	-	-	-	-	1.19	0.69	**0**	**1**	-	-	2.1k	**1**
40057	1.01	1.04	230	**1**	0.73	0.58	**-8**	**1**	-	-	-12	**1**
40073	1.54	3.38	276	**1**	1.66	1.05	**1**	**1**	-	-	74	**1**
40085	1.17	1.23	176	**1**	2.23	0.98	**-1**	**1**	-	-	94	**1**
40092	0.59	0.44	804	**1**	0.97	0.69	**1**	**1**	-	-	19	**1**
40093	-	-	-	-	0.90	0.52	**1**	**1**	-	-	2.9k	**1**
40096	0.49	0.41	56	**1**	0.67	0.48	**1**	**1**	-	-	15	**1**
40097	0.78	0.40	117	**1**	1.82	0.78	**1**	**1**	-	-	1.7k	**1**
40108	1.83	1.16	356	**1**	0.90	0.66	**1**	**1**	-	-	11	**1**
40110	0.42	0.29	45	**1**	0.64	0.44	**1**	**1**	-	-	1.8k	**1**

40119	0.43	0.31	81	**1**	0.84	0.60	**1**	**1**	-	-	1.2k	**1**
40123	1.14	0.96	142	**1**	1.49	0.85	**1**	**1**	-	-	69	**1**
40144	1.31	0.56	159	**1**	1.99	0.93	**-1**	**1**	-	-	31	**1**
40145	1.95	1.37	78	**1**	1.21	0.75	**0**	**1**	-	-	95	**1**
40149	0.57	0.42	51	**1**	0.90	0.61	**1**	**1**	-	-	12	**1**
40177	1.62	1.23	197	**1**	1.21	0.70	**1**	**1**	-	-	2.6k	**1**
40180	2.29	1.77	426	**1**	1.20	0.72	**1**	**1**	-	-	3.0k	**1**
40190	4.90	4.20	163	**1**	1.05	1.04	**1**	**1**	-	-	52	**1**
40193	1.73	1.20	443	**1**	0.69	0.49	**0**	**1**	-	-	3.4k	**1**
40208	11.81	7.50	8	**1**	1.39	0.66	**1**	**1**	-	-	119	**1**
40225	0.73	0.48	223	**1**	1.19	0.72	**1**	**1**	-	-	2.2k	**1**
40270	6.61	6.63	474	**1**	1.07	0.63	**0**	**1**	-	-	2.7k	**1**
40271	1.64	3.05	367	**1**	0.98	0.87	**1**	**1**	-	-	16	**1**
40274	1.86	1.32	52	**1**	1.20	0.76	**0**	**1**	-	-	52	**1**
40275	1.18	1.13	198	**1**	0.99	0.67	**0**	**1**	-	-	49	**1**
40276	0.47	0.32	77	**1**	0.81	0.58	**0**	**1**	-	-	2.6k	**1**
40278	4.00	2.86	364	**1**	1.28	0.92	**1**	**1**	-	-	30	**1**
40313	2.58	1.83	935	**1**	0.74	0.54	**0**	**1**	-	-	3.4k	**1**
40327	1.14	1.21	187	**1**	0.83	0.54	**0**	**1**	-	-	84	**1**
40345	7.10	5.10	183	**1**	2.61	1.91	**1**	**1**	-	-	2.2k	**1**
40361	2.91	2.97	206	**1**	1.51	1.51	**1**	**1**	-	-	-	-
40365	2.57	2.26	519	**1**	1.22	0.73	**1**	**1**	-	-	152	**1**
40381	0.82	0.62	133	**1**	1.25	0.74	**1**	**1**	-	-	70	**1**
40390	-	-	-	-	6.15	6.34	**1**	**1**	-	-	613	**1**
40401	0.94	0.69	127	**1**	1.18	0.70	**1**	**1**	-	-	53	**1**
40431	1.90	1.41	160	**1**	2.86	12.03	5.1k	**1**	-	-	136	**1**
40478	0.45	0.32	256	**1**	0.70	0.51	**0**	**1**	-	-	103	**1**
40525	1.34	0.90	499	**1**	0.84	0.60	**-4**	**1**	-	-	122	**1**
40563	-	-	-	-	0.80	0.55	**1**	**1**	-	-	48	**1**
40566	0.62	0.55	330	**1**	0.92	0.49	**1**	**1**	-	-	2.6k	**1**
40574	0.74	0.44	91	**1**	1.28	0.73	**1**	**1**	-	-	45	**1**
40578	1.51	1.07	530	**1**	0.79	13.88	-1	**1**	-	-	3.1k	**1**
40582	2.04	2.02	466	**1**	0.93	0.68	**-6**	**1**	-	-	3.9k	**1**
40640	0.85	0.50	66	**1**	1.03	0.59	**-2**	**1**	-	-	1.8k	**1**
40719	1.63	2.56	235	**1**	1.19	0.69	**0**	**1**	-	-	3.1k	**1**
40720	-	-	-	-	7.98	8.04	**1**	**1**	-	-	155	4
40743	1.24	2.34	295	**1**	0.95	0.55	**1**	**1**	-	-	96	**1**
40757	2.54	1.79	136	**1**	10.70	1.24	6	**1**	-	-	50	2
40780	3.74	1.39	493	**1**	1.17	0.66	**0**	**1**	-	-	2.6k	**1**
40790	0.53	0.36	314	**1**	2.44	1.12	**-3**	**1**	-	-	33	**1**
40850	1.18	0.89	237	**1**	0.96	0.67	**0**	**1**	-	-	99	**1**
40860	0.46	0.33	95	**1**	0.82	0.58	**1**	**1**	-	-	922	**1**
40861	0.78	0.55	168	**1**	1.75	0.97	**1**	**1**	-	-	68	**1**
40884	0.46	0.36	141	**1**	1.06	0.68	**1**	**1**	-	-	1.3k	**1**
40950	0.54	0.39	148	**1**	1.18	0.70	**-1**	**1**	-	-	2.5k	**1**
40988	2.14	5.99	452	**1**	0.98	0.84	**1**	**1**	-	-	27	**1**
41118	3.49	2.58	428	**1**	1.44	1.14	**1**	**1**	-	-	47	**1**
41119	1.04	0.53	91	**1**	1.32	0.79	**1**	**1**	-	-	140	**1**
41169	1.29	0.91	226	**1**	0.82	0.71	**1**	**1**	-	-	848	**1**
41188	0.59	0.48	185	**1**	0.84	0.58	**0**	**1**	-	-	1.9k	**1**
41225	1.52	1.15	197	**1**	0.85	0.63	**-2**	**1**	-	-	2.5k	**1**
41266	1.99	1.50	83	**1**	1.07	0.86	**0**	**1**	-	-	88	**1**
41275	0.40	0.32	217	**1**	0.80	0.57	**0**	**1**	-	-	77	**1**

41305	6.89	14.04	1.2k	**1**	0.72	0.50	**1**	**1**	-	-	3.1k	**1**
41334	1.03	0.73	235	**1**	1.25	0.76	**1**	**1**	-	-	24	2
41550	0.53	0.38	155	**1**	1.10	0.69	**1**	**1**	-	-	70	**1**
41772	2.74	2.34	144	**1**	1.45	0.84	**1**	**1**	-	-	69	**1**
41774	2.55	2.03	350	**1**	0.79	0.56	**1**	**1**	-	-	2.1k	**1**
41839	0.58	0.41	233	**1**	0.74	0.44	**-4**	**1**	-	-	124	**1**
41859	1.46	2.72	560	**1**	1.11	0.69	**0**	**1**	-	-	1.9k	**1**
41984	0.55	0.52	137	**1**	0.86	0.57	**1**	**1**	-	-	752	**1**
42020	1.22	0.86	144	**1**	1.10	0.64	**-1**	**1**	-	-	3.4k	**1**
42185	2.60	2.39	425	**1**	0.93	0.49	**1**	**1**	-	-	855	**1**
42242	0.62	0.42	161	**1**	1.38	0.72	**1**	**1**	-	-	30	**1**
42394	1.49	1.18	269	**1**	1.50	0.61	**0**	**1**	-	-	201	**1**
42511	0.89	0.63	121	**1**	1.73	1.00	**0**	**1**	-	-	59	**1**
42845	0.87	0.55	301	**1**	0.64	0.44	**1**	**1**	-	-	2.1k	**1**
42950	1.87	1.31	505	**1**	1.15	0.67	**0**	**1**	-	-	2.6k	**1**
43248	1.86	1.32	67	**1**	1.15	0.81	**0**	**1**	-	-	45	**1**
43413	1.00	0.72	241	**1**	1.21	0.67	**0**	**1**	-	-	56	**1**
43535	0.46	0.38	220	**1**	0.92	0.65	**-1**	**1**	-	-	139	**1**
43588	1.09	0.80	202	**1**	1.38	0.83	**1**	**1**	-	-	92	2
44709	0.77	0.62	57	**1**	0.89	0.63	**1**	**1**	-	-	1.5k	**1**
45127	1.19	0.86	252	**1**	0.95	0.62	**1**	**1**	-	-	109	**1**
45548	0.49	0.31	72	**1**	0.80	0.58	**0**	**1**	-	-	38	**1**
46146	0.43	0.33	142	**1**	0.97	0.58	**-1**	**1**	-	-	2.5k	**1**
46533	0.80	0.48	147	**1**	1.39	0.80	**0**	**1**	-	-	39	**1**
46706	2.02	3.61	241	**1**	3.40	1.29	**-1**	**1**	-	-	101	**1**
46889	1.55	1.10	427	**1**	0.70	0.49	**0**	**1**	-	-	3.6k	**1**
47054	1.14	0.83	130	**1**	1.72	1.72	**1**	**1**	-	-	46	**1**

Table 3. Detailed quantitative results for the organic models: Hausdorff distances (ϵ^1, ϵ^2), Euler characteristic (χ), and number of connected components (b_0) for each input file and selected methods.Best values are shown in **bold**.

Model	OURS				MATFP				MATTOPO				NSK				PC-160			
Param	ϵ^1	ϵ^2	χ	b_0	ϵ^1	ϵ^2	χ	b_0	ϵ^1	ϵ^2	χ	b_0	ϵ^1	ϵ^2	χ	b_0	ϵ^1	ϵ^2	χ	b_0
bear	**0.35**	**0.36**	**1**	**1**	0.90	1.72	2	2	0.79	2.52	**1**	**1**	-	-	22	**1**	0.73	3.28	79k	**1**
bug	**0.36**	**0.36**	**1**	**1**	2.41	1.53	16	16	0.50	0.58	**1**	**1**	-	-	4	**1**	0.38	0.83	58k	**1**
chair	0.36	**0.37**	**-2**	**1**	4.65	1.82	22	23	0.56	0.75	**-2**	**1**	-	-	5	**1**	0.48	0.66	62k	**1**
dolphin	1.15	0.70	**1**	**1**	0.44	0.47	**1**	**1**	0.46	0.46	**1**	**1**	-	-	7	**1**	0.29	**0.33**	50k	**1**
hand	**0.44**	2.72	-1	**1**	10.20	3.65	15	16	0.76	0.98	**1**	**1**	-	-	4	**1**	0.71	0.96	116k	**1**
plane	0.38	0.37	**1**	**1**	0.62	0.62	3	3	0.32	0.41	**1**	**1**	-	-	495	**1**	0.28	0.30	33k	**1**
teapot	**0.53**	**0.51**	**-4**	**1**	1.41	2.84	3	6	1.88	1.72	**-4**	**1**	-	-	16	**1**	1.11	1.10	96k	**1**
venus	**0.34**	**0.33**	**1**	**1**	1.93	5.34	**1**	**1**	1.50	3.04	**1**	**1**	-	-	46	**1**	2.53	4.00	76k	**1**

Model	PC-200				SAT-0.03				SAT-0.04				VC				VMAS			
Param	ϵ^1	ϵ^2	χ	b_0	ϵ^1	ϵ^2	χ	b_0	ϵ^1	ϵ^2	χ	b_0	ϵ^1	ϵ^2	χ	b_0	ϵ^1	ϵ^2	χ	b_0
bear	0.74	2.71	130k	**1**	1.72	3.95	11	**1**	1.15	3.66	10	**1**	0.52	1.46	**1**	**1**	0.53	3.80	212	**1**
bug	0.43	0.55	99k	**1**	1.36	6.83	15	9	1.58	6.39	19	10	1.28	1.86	**1**	**1**	0.57	1.57	48	**1**
chair	0.39	1.19	109k	**1**	2.20	7.04	28	7	5.30	7.03	25	12	0.57	0.55	**-2**	**1**	**0.34**	0.44	83	**1**
dolphin	0.35	0.44	83k	**1**	3.02	4.64	19	**1**	6.31	7.98	12	**1**	3.97	1.39	**1**	**1**	**0.28**	0.91	156	**1**
hand	0.62	5.08	178k	**1**	1.06	1.11	7	3	1.07	7.77	6	4	0.61	**0.64**	**1**	**1**	2.35	1.81	79	**1**
plane	**0.17**	**0.17**	55k	**1**	2.87	6.90	5	**1**	4.59	8.63	6	**1**	7.45	1.12	**1**	**1**	0.20	0.22	82	**1**
teapot	1.01	1.51	152k	**1**	1.96	5.55	23	2	3.50	6.89	10	3	1.52	1.18	**-4**	**1**	1.87	1.42	280	**1**
venus	1.85	2.51	125k	**1**	2.46	2.30	29	**1**	1.17	1.14	10	**1**	-	-	**1**	-	1.81	1.72	380	**1**