

The 3D Motorcycle Complex for Structured Volume Decomposition

— Supplement —

A. Sparse Serial Motorcycle Complex

Let us expand on the remark in Sec. 4.2 about the alternative of a serial motorcycle complex construction. A proposal in [EGKT08, §7] for the 2D case is to trace motorcycles in a serial rather than simultaneous manner. While this voids canonicity[†], it enables the option to omit tracing motorcycles that would form removable (though not regular-removable) traces right away. For instance, if the two directions neighboring the next motorcycle’s direction around a singularity have been traced (out of or into the singularity) already, the motorcycle can be omitted. The result (called *sparse MC* in the following) will be coarser, though not necessarily irreducible.

Following this idea, Alg. A is a modified variant of Alg. 1; the parametrization based Alg. 2 can be modified analogously. The key difference is that fire sources (facets incident at singularities) are processed one after the other, and those that are not necessary to establish a valid configuration around a singularity are skipped. In the loop (line 1) we prioritize edges that already have some incident burnt facets, and process facets f around an edge e in circular order.

The condition $\text{necessary}(e, f)$ (line 2) is defined as follows. Let $f_{-2}, f_{-1}, f, f_{+1}, f_{+2}$ denote the (possibly cyclically self-overlapping) sequence of facets incident at singular edge e surrounding facet f (in either orientation). Condition $\text{necessary}(e, f)$ is true iff either f_{-1} and f_{+1} are not burnt yet, or f_{-1} and f_{+2} are burnt but not f_{+1} , or f_{-2} and f_{+1} are burnt but not f_{-1} . In these cases f needs to be burnt (i.e., become part of the motorcycle complex as well) as well—otherwise the complex would contain cells

[†] While the simultaneously constructed 2D motorcycle graph yields a *canonical* decomposition, its serial construction voids this property due to order dependence. For 3D neither algorithm yields a canonical partition, as already the crucial 2D right hand arbitration rule does not extend to 3D.

Model	raw	MC	MC _s	MC _{rs}	MC _s / MC _s	MC _s / MC _{rs}
EXAMPLE 3	9087	2877	5125	2691	56.1%	106.9%
EXAMPLE 1	3137	1123	1199	962	93.7%	116.7%
EXAMPLE 2	233	87	280	101	31.1%	86.1%
DRAGON-HEX	979	357	399	317	89.5%	112.6
GARGOYLE	720	257	283	220	90.8%	116.8%
ANC101 A1	1359	460	524	422	87.8%	109.0%
FERTILITY-HEX	221	76	80	66	95.0%	115.2%
PEGASUS-HEX	1035	374	408	287	91.7%	130.3%
KISS HEX	543	200	244	189	82.0%	105.8%
ANC101	609	207	136	120	152.2%	172.5%
IMPELLER STRESSTEST	184	37	71	61	52.1%	60.7%
ARMADILLO HEX-A	680	266	292	227	91.1%	117.2%
ARMADILLO HEX-B	396	147	176	133	83.5%	110.5%
			⋮			
EXAMPLE 5	1	1	1	1	100.0	100.0%

Table A: Using the dataset from Table 1, reported are the number of blocks in the raw motorcycle complex (raw), fully reduced motorcycle complex (MC), sparse serial motorcycle complex (MC_s) and its reduced version (MC_{rs})

with edges with inner angles of 270° (or larger) and would not be a pure cuboid block decomposition.

Algorithm A: Serial Motorcycle Complex of Hex Mesh

```

1 foreach singular  $e$  and  $f \in F_e$  do
2   if necessary( $e, f$ ) then  $Q.\text{push}((e, f, 0))$  // ignite
   while  $Q$  non-empty do
     ( $e, f, d$ )  $\leftarrow Q.\text{pop}()$ 
     if alive( $e$ ) then // not crossing burnt terrain
       tag  $f$  // mark facet as burnt
       foreach regular interior edge  $e' \neq e$  incident to
          $f$  do
           if opp( $e', f$ ) is not tagged then
              $Q.\text{push}(e', \text{opp}(e', f), d+1)$  // spread
   foreach boundary facet  $f$  do tag  $f$ 

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In essence, the algorithm attempts to omit “every other” (to the extent permitted by parity) wall around a singularity right away, rather than achieving this via reduction by wall retraction afterwards. Note that the incorporation of a similar omission strategy directly into the *non-serial* algorithm (as done for the 2D case in [SPGT18, §3.1]) would not be straightforward because the a priori omission decision cannot be made simply per singularity in isolation but would require some form of global coordination in the interconnected network of singular arcs in the 3D case.

The result is a block decomposition that can be expected to be coarser than the immediate result (without reduction by wall retraction) of the algorithms from Sec. 5. Indeed this is the case; however, our proposed *reduced* motorcycle complex typically is even simpler than this sparse serial motorcycle complex, as evident from Tables A and B. Of course reduction could also be applied to the sparse MC, but this yields no consistent benefit (last column).

Model	raw	MC	MC _s	MC _{rs}	MC _s / MC _s	MC _s / MC _{rs}
ARMADILLO	392	132	207	121	63.8%	109.1%
BONE	57	15	25	18	60.0%	83.3%
BROKEN BULLET	25	5	11	9	45.5%	55.6%
CAMILLE HAND	75	26	42	27	61.9%	96.3%
CUBE SPHERE	10	4	6	6	66.7%	66.7%
CYLINDER	11	5	5	5	100.0%	100.0%
FANDISK	43	19	17	14	111.8%	135.7%
FANPART	5	3	5	3	60.0%	100.0%
JOINT	54	15	21	14	71.4%	107.1%
KITTEN	77	19	53	30	35.8%	63.3%
PRISMA	3	2	2	2	100.0%	100.0%
ROCKERARM	217	78	183	114	42.6%	68.4%
SCULPTURE	27	13	18	13	72.2%	100.0%
SPHERE	7	2	5	2	40.0%	100.0%
TETRAHEDRON	4	2	3	2	66.7%	100.0%

Table B: Using the dataset from Table 2, reported are the number of blocks in the raw motorcycle complex (raw), fully reduced motorcycle complex (MC), sparse serial motorcycle complex (MC_s) and its reduced version (MC_{rs})

C. Complete Version of Table 1

Model	BC	BC ⁻	raw	MC ⁺	MC ⁻	T	MC	MC/BC
2018 - FUZZY CLUSTERING BASED PSEUDO-SWEPT VOLUME DECOMPOSITION FOR HEXAHEDRAL MESHING_EXAMPLE_3	406136	67828	9087	5780	1.42%	41.63%	2877	0.71%
2018 - FUZZY CLUSTERING BASED PSEUDO-SWEPT VOLUME DECOMPOSITION FOR HEXAHEDRAL MESHING_EXAMPLE_1	74331	11385	3137	2248	3.02%	15.09%	1123	1.51%
2018 - FUZZY CLUSTERING BASED PSEUDO-SWEPT VOLUME DECOMPOSITION FOR HEXAHEDRAL MESHING_EXAMPLE_2	3253	678	233	195	5.99%	13.67%	87	2.67%
2016 - ALL-HEX MESHING USING CLOSED-FORM INDUCED POLYCUBE_DRAGON-HEX	12488	2959	979	724	5.8%	36.33%	357	2.86%
2014 - L1-BASED CONSTRUCTION OF POLYCUBE MAPS FROM COMPLEX SHAPES_GARGOYLE	7563	1967	720	546	7.22%	37.62%	257	3.4%
2011 - ALL-HEX MESH GENERATION VIA VOLUMETRIC POLYCUBE DEFORMATION_ANC101_A1	12336	3118	1359	846	6.86%	45.33%	460	3.73%
2016 - ALL-HEX MESHING USING CLOSED-FORM INDUCED POLYCUBE_FERTILITY-HEX	2002	548	221	189	9.44%	27.02%	76	3.8%
2016 - ALL-HEX MESHING USING CLOSED-FORM INDUCED POLYCUBE_PEGASUS-HEX	9745	2415	1035	729	7.48%	36.29%	374	3.84%
2016 - EFFICIENT VOLUMETRIC POLYCUBE-MAP CONSTRUCTION_KISS_HEX	5019	1194	543	385	7.67%	39.3%	200	3.98%
2014 - L1-BASED CONSTRUCTION OF POLYCUBE MAPS FROM COMPLEX SHAPES_ANC101	5009	1283	609	347	6.93%	38.9%	207	4.13%
2015 - PRACTICAL HEX-MESH OPTIMIZATION VIA EDGE-CONE RECTIFICATION_IMPPELLER_STRESSTEST_IN	878	176	184	124	14.12%	23.86%	37	4.21%
2015 - PRACTICAL HEX-MESH OPTIMIZATION VIA EDGE-CONE RECTIFICATION_IMPPELLER_STRESSTEST_OUT	878	176	184	124	14.12%	23.86%	37	4.21%
2012 - ALL-HEX MESHING USING SINGULARITY-RESTRICTED FIELD_IMPPELLER	878	182	184	124	14.12%	23.86%	39	4.44%
2016 - EFFICIENT VOLUMETRIC POLYCUBE-MAP CONSTRUCTION_ARMADILLO_HEX-A	5960	1491	680	516	8.66%	34.19%	266	4.46%
2016 - EFFICIENT VOLUMETRIC POLYCUBE-MAP CONSTRUCTION_ARMADILLO_HEX-B	3265	820	396	296	9.07%	31.45%	147	4.5%
2014 - L1-BASED CONSTRUCTION OF POLYCUBE MAPS FROM COMPLEX SHAPES_DANCING-CHILDREN-2	5482	1516	672	533	9.72%	32.9%	259	4.72%
2015 - PRACTICAL HEX-MESH OPTIMIZATION VIA EDGE-CONE RECTIFICATION_DANCINGCHILDREN_IN	5482	1406	703	546	9.96%	34.52%	274	5%
2015 - PRACTICAL HEX-MESH OPTIMIZATION VIA EDGE-CONE RECTIFICATION_DANCINGCHILDREN_OUT	5482	1406	703	546	9.96%	34.52%	274	5%
2016 - ALL-HEX MESHING USING CLOSED-FORM INDUCED POLYCUBE_CHINESE-LION-HEX	6235	1468	818	589	9.45%	38.82%	321	5.15%
2016 - EFFICIENT VOLUMETRIC POLYCUBE-MAP CONSTRUCTION_DANCING_CHILDREN_HEX	4755	1181	682	532	11.19%	31.97%	272	5.19%
2012 - ALL-HEX MESHING USING SINGULARITY-RESTRICTED FIELD_FERTILITY	1352	342	234	188	13.91%	29.45%	77	5.33%
2015 - PRACTICAL HEX-MESH OPTIMIZATION VIA EDGE-CONE RECTIFICATION_ARMADILLO_IN	2112	348	308	265	12.55%	24.53%	114	5.4%
2015 - PRACTICAL HEX-MESH OPTIMIZATION VIA EDGE-CONE RECTIFICATION_ARMADILLO_OUT	2112	348	308	265	12.55%	24.53%	114	5.4%
2015 - PRACTICAL HEX-MESH OPTIMIZATION VIA EDGE-CONE RECTIFICATION_ARMADILLO_STRESSTEST_IN	2112	348	308	265	12.55%	24.53%	114	5.4%
2015 - PRACTICAL HEX-MESH OPTIMIZATION VIA EDGE-CONE RECTIFICATION_ARMADILLO_STRESSTEST_OUT	2112	348	308	265	12.55%	24.53%	114	5.4%
2014 - L1-BASED CONSTRUCTION OF POLYCUBE MAPS FROM COMPLEX SHAPES_COGNIT	5194	1350	759	574	11.05%	32.35%	298	5.74%
2016 - EFFICIENT VOLUMETRIC POLYCUBE-MAP CONSTRUCTION_DRAGON_HEX	3655	853	569	442	12.09%	28.81%	212	5.8%
2014 - L1-BASED CONSTRUCTION OF POLYCUBE MAPS FROM COMPLEX SHAPES_ELEPHANT	2842	692	415	346	12.17%	28.97%	167	5.88%
2016 - EFFICIENT VOLUMETRIC POLYCUBE-MAP CONSTRUCTION_ELEPHANT_HEX	3105	770	527	399	12.85%	29.15%	189	6.09%
2016 - EFFICIENT VOLUMETRIC POLYCUBE-MAP CONSTRUCTION_BUNNY_HEX	1282	348	257	187	14.59%	30.74%	80	6.24%
2011 - ALL-HEX MESH GENERATION VIA VOLUMETRIC POLYCUBE DEFORMATION_KISS_HEX_COARSE	3690	1023	557	402	10.89%	38.44%	231	6.26%
2015 - PRACTICAL HEX-MESH OPTIMIZATION VIA EDGE-CONE RECTIFICATION_DRAGON_IN	2019	495	340	220	10.9%	27.43%	127	6.29%
2015 - PRACTICAL HEX-MESH OPTIMIZATION VIA EDGE-CONE RECTIFICATION_DRAGON_OUT	2019	495	340	220	10.9%	27.43%	127	6.29%
2011 - ALL-HEX MESH GENERATION VIA VOLUMETRIC POLYCUBE DEFORMATION_CASTING	2805	701	524	409	14.58%	29.47%	185	6.6%
2011 - ALL-HEX MESH GENERATION VIA VOLUMETRIC POLYCUBE DEFORMATION_KISS_HEX	3690	1075	688	434	11.76%	39.25%	255	6.91%
2016 - POLYCUBE SIMPLIFICATION FOR COARSE LAYOUTS OF SURFACES AND VOLUMES_CHINESE_DRAGON_POLYCUBE_IN	810	189	174	147	18.15%	22.66%	56	6.91%
2016 - ALL-HEX MESHING USING CLOSED-FORM INDUCED POLYCUBE_GRAYLOC-HEX	3183	804	604	477	14.99%	27.97%	222	6.97%
2013 - POLYCU-T - MONOTONE GRAPH-CUTS FOR POLYCUBE BASE-COMPLEX CONSTRUCTION_CARTER_HEX_OPT	2500	635	537	410	16.4%	33.74%	182	7.28%
2011 - ALL-HEX MESH GENERATION VIA VOLUMETRIC POLYCUBE DEFORMATION_STAB3_REFINE3	2227	580	419	290	13.02%	36.08%	163	7.32%
2011 - ALL-HEX MESH GENERATION VIA VOLUMETRIC POLYCUBE DEFORMATION_BUNNY_HEX	1324	373	275	194	14.65%	31.87%	97	7.33%
2016 - POLYCUBE SIMPLIFICATION FOR COARSE LAYOUTS OF SURFACES AND VOLUMES_ROCKERARM_MODEL_IN	678	152	162	130	19.17%	25.86%	50	7.37%
2016 - POLYCUBE SIMPLIFICATION FOR COARSE LAYOUTS OF SURFACES AND VOLUMES_ROCKERARM_POLYCUBE_IN	678	152	162	130	19.17%	25.86%	50	7.37%
2017 - A GLOBAL APPROACH TO MULTI-AXIS SWEPT MESH GENERATION_EXAMPLE_4	1360	324	302	201	14.78%	24.19%	101	7.43%
2014 - L1-BASED CONSTRUCTION OF POLYCUBE MAPS FROM COMPLEX SHAPES_DRAGON	3977	998	836	661	16.62%	28.78%	301	7.57%
2016 - ALL-HEX MESHING USING CLOSED-FORM INDUCED POLYCUBE_ROCKERARM-HEX	1202	306	223	181	15.06%	28.03%	91	7.57%
2017 - A GLOBAL APPROACH TO MULTI-AXIS SWEPT MESH GENERATION_EXAMPLE_1	1037	243	225	150	14.46%	22.32%	81	7.81%
2016 - EFFICIENT VOLUMETRIC POLYCUBE-MAP CONSTRUCTION_BUSTE_HEX	1081	275	244	182	16.84%	32.4%	85	7.86%
2016 - EFFICIENT VOLUMETRIC POLYCUBE-MAP CONSTRUCTION_GREEK_SCULPTURE_HEX	1476	315	310	244	16.53%	28.44%	118	7.99%
2019 - SINGULARITY STRUCTURE SIMPLIFICATION OF HEXAHEDRAL MESH VIA WEIGHTED RANKING_DECKEL_INPUT	53116	12557	10922	8823	16.61%	33.39%	4249	8%
2016 - POLYCUBE SIMPLIFICATION FOR COARSE LAYOUTS OF SURFACES AND VOLUMES_BUNNY_MODEL_IN	637	141	151	124	19.47%	26.89%	51	8.01%
2016 - POLYCUBE SIMPLIFICATION FOR COARSE LAYOUTS OF SURFACES AND VOLUMES_BUNNY_POLYCUBE_IN	637	141	151	124	19.47%	26.89%	51	8.01%
2016 - EFFICIENT VOLUMETRIC POLYCUBE-MAP CONSTRUCTION_CARTER_HEX	2788	616	630	450	16.14%	34.55%	228	8.18%
2013 - POLYCU-T - MONOTONE GRAPH-CUTS FOR POLYCUBE BASE-COMPLEX CONSTRUCTION_BU_HEX_OPT	580	141	132	113	19.48%	27.21%	48	8.28%
2014 - L1-BASED CONSTRUCTION OF POLYCUBE MAPS FROM COMPLEX SHAPES_ROCKERARM_2	835	167	189	149	17.84%	30.57%	71	8.5%
2016 - EFFICIENT VOLUMETRIC POLYCUBE-MAP CONSTRUCTION_BIMBA_HEX-C	760	176	204	146	19.21%	30.68%	68	8.95%
2012 - ALL-HEX MESHING USING SINGULARITY-RESTRICTED FIELD_ROCKERARM	578	135	150	120	20.76%	30.66%	52	9%
2011 - ALL-HEX MESH GENERATION VIA VOLUMETRIC POLYCUBE DEFORMATION_BUMPY_TORUS	2518	631	595	446	17.71%	32.19%	228	9.05%
2011 - ALL-HEX MESH GENERATION VIA VOLUMETRIC POLYCUBE DEFORMATION_BU_REMESH_HEX	1098	308	301	202	18.4%	33.15%	102	9.29%
2017 - A GLOBAL APPROACH TO MULTI-AXIS SWEPT MESH GENERATION_EXAMPLE_3	1122	280	341	264	23.53%	18.57%	105	9.36%
2016 - EFFICIENT VOLUMETRIC POLYCUBE-MAP CONSTRUCTION_SPHINX_HEX-E	801	229	222	161	20.1%	32.19%	75	9.36%
2016 - EFFICIENT VOLUMETRIC POLYCUBE-MAP CONSTRUCTION_ROCKER_HEX	730	187	199	156	21.37%	28.02%	69	9.45%
2017 - A GLOBAL APPROACH TO MULTI-AXIS SWEPT MESH GENERATION_EXAMPLE_2	974	224	288	202	20.74%	24.89%	95	9.75%
2016 - POLYCUBE SIMPLIFICATION FOR COARSE LAYOUTS OF SURFACES AND VOLUMES_TEAPOT_MODEL_IN	328	68	108	89	27.13%	28.6%	32	9.76%
2016 - POLYCUBE SIMPLIFICATION FOR COARSE LAYOUTS OF SURFACES AND VOLUMES_TEAPOT_POLYCUBE_IN	328	68	108	89	27.13%	28.6%	32	9.76%
2014 - L1-BASED CONSTRUCTION OF POLYCUBE MAPS FROM COMPLEX SHAPES_BUMPY_TORUS	2254	640	592	488	21.65%	29.29%	224	9.94%
2013 - POLYCU-T - MONOTONE GRAPH-CUTS FOR POLYCUBE BASE-COMPLEX CONSTRUCTION_ROCKER_ARM_HEX_OPT	664	176	184	138	20.78%	28.81%	67	10.09%
2016 - ALL-HEX MESHING USING CLOSED-FORM INDUCED POLYCUBE_KITTEN-HEX	208	57	71	57	27.4%	24.66%	21	10.1%
2016 - SKELETON-DRIVEN ADAPTIVE HEXAHEDRAL MESHING OF TUBULAR SHAPES_WARRIOR_GRADED	4869	1306	1447	1282	26.33%	30.81%	492	10.1%
2019 - DUAL SHEET MESHING - AN INTERACTIVE APPROACH TO ROBUST HEXAHEDRALIZATION_FANDISK.LIU18	89	20	35	26	29.21%	13.66%	9	10.11%
2014 - L1-BASED CONSTRUCTION OF POLYCUBE MAPS FROM COMPLEX SHAPES_ANGEL_1	1284	336	362	266	20.72%	34.99%	131	10.2%
2016 - ALL-HEX MESHING USING CLOSED-FORM INDUCED POLYCUBE_CARTER-HEX	1101	235	359	266	24.16%	35.2%	114	10.35%
2016 - SKELETON-DRIVEN ADAPTIVE HEXAHEDRAL MESHING OF TUBULAR SHAPES_DINOPET_GRADED	2253	617	721	630	27.96%	32.67%	234	10.39%
2015 - PRACTICAL HEX-MESH OPTIMIZATION VIA EDGE-CONE RECTIFICATION_BUST_IN	494	102	128	110	22.27%	27.34%	52	10.53%
2015 - PRACTICAL HEX-MESH OPTIMIZATION VIA EDGE-CONE RECTIFICATION_BUST_OUT	494	102	128	110	22.27%	27.34%	52	10.53%
2015 - PRACTICAL HEX-MESH OPTIMIZATION VIA EDGE-CONE RECTIFICATION_KINGKONG_IN	180	45	71	62	34.44%	25%	19	10.56%
2015 - PRACTICAL HEX-MESH OPTIMIZATION VIA EDGE-CONE RECTIFICATION_KINGKONG_OUT	180	45	71	62	34.44%	25%	19	10.56%
2014 - L1-BASED CONSTRUCTION OF POLYCUBE MAPS FROM COMPLEX SHAPES_KISS	1896	567	560	418	22.05%	32.88%	205	10.81%
2016 - SKELETON-DRIVEN ADAPTIVE HEXAHEDRAL MESHING OF TUBULAR SHAPES_DINO_GRADED	904	275	306	261	28.87%	33.99%	99	10.95%
2016 - STRUCTURED VOLUME DECOMPOSITION VIA GENERALIZED SWEEPING_FERTILITY_1	301	73	119	105	34.88%	22.71%	33	10.96%
2019 - SELECTIVE PADDING FOR POLYCUBE-BASED HEXAHEDRAL MESHING_DOUBLE_HINGE_WH	153	16	43	43	28.1%	10%	17	11.11%
2016 - STRUCTURED VOLUME DECOMPOSITION VIA GENERALIZED SWEEPING_FERTILITY_2	301	50	119	105	34.88%	22.71%	34	11.3%
2016 - STRUCTURED VOLUME DECOMPOSITION VIA GENERALIZED SWEEPING_FERTILITY_3	301	71	119	105	34.88%	22.71%	34	11.3%
2013 - POLYCU-T - MONOTONE GRAPH-CUTS FOR POLYCUBE BASE-COMPLEX CONSTRUCTION_BUNNY_HEX_OPT	580	120	170	127	21.9%	30.17%	66	11.48%
2016 - POLYCUBE SIMPLIFICATION FOR COARSE LAYOUTS OF SURFACES AND VOLUMES_ASM_MODEL_OUT	122	33	68	64	52.46%	14.29%	14	11.48%
2016 - POLYCUBE SIMPLIFICATION FOR COARSE LAYOUTS OF SURFACES AND VOLUMES_ASM_POLYCUBE_OUT	122	33	68	64	52.46%	14.29%	14	11.48%
2017 - HEXAHEDRAL MESH GENERATION VIA CONSTRAINED QUADRILATERALIZATION_JOINT	83	18	41	27	32.53%	15.43%	10	12.05%
2016 - POLYCUBE SIMPLIFICATION FOR COARSE LAYOUTS OF SURFACES AND VOLUMES_FANDISK_POLYCUBE_IN	229	49	89	70	30.57%	21.43%	29	12.66%

Table C: Statistics on a dataset of hexahedral meshes. Numbers of blocks in the base complex (BC), reduced base complex (BC⁻), raw motorcycle complex (raw), reduced motorcycle complex with preserved singularity-adjacent walls (MC⁺), fully reduced motorcycle complex (MC), percentage of arcs that are T-arcs (T).

Model	BC	BC ⁻	raw	MC ⁺	$\frac{MC^+}{BC}$	T	MC	$\frac{MC}{BC}$
2014 - L1-BASED CONSTRUCTION OF POLYCUBE MAPS FROM COMPLEX SHAPES_ROCKERARM_1	686	183	247	186	27.11%	27.02%	87	12.68%
2015 - PRACTICAL HEX-MESH OPTIMIZATION VIA EDGE-CONE RECTIFICATION_CAP_IN	327	97	124	92	28.13%	34.55%	42	12.84%
2015 - PRACTICAL HEX-MESH OPTIMIZATION VIA EDGE-CONE RECTIFICATION_CAP_OUT	327	97	124	92	28.13%	34.55%	42	12.84%
2016 - POLYCUBE SIMPLIFICATION FOR COARSE LAYOUTS OF SURFACES AND VOLUMES_ROCKERARM_MODEL_OUT	316	62	130	116	36.71%	16.14%	41	12.97%
2013 - POLYCUBE SIMPLIFICATION FOR COARSE LAYOUTS OF SURFACES AND VOLUMES_ROCKERARM_MODEL_OUT	693	153	243	202	29.15%	25.95%	91	13.13%
2016 - POLYCUBE SIMPLIFICATION FOR COARSE LAYOUTS OF SURFACES AND VOLUMES_ROCKERARM_POLYCUBE_OUT	348	60	132	117	33.62%	19.5%	46	13.22%
2016 - EFFICIENT VOLUMETRIC POLYCUBE-MAP CONSTRUCTION_BIMBA_HEX-D	196	60	97	63	32.14%	23.77%	26	13.27%
2019 - SELECTIVE PADDING FOR POLYCUBE-BASED HEXAHEDRAL MESHING_LEG0_L2	525	83	221	167	31.81%	29.6%	70	13.33%
2019 - DUAL SHEET MESHING - AN INTERACTIVE APPROACH TO ROBUST HEXAHEDRALIZATION_FANDISK	89	14	36	27	30.34%	10.99%	12	13.48%
2016 - EFFICIENT VOLUMETRIC POLYCUBE-MAP CONSTRUCTION_BLADE_HEX	389	90	142	130	33.42%	20.78%	53	13.62%
2016 - EFFICIENT VOLUMETRIC POLYCUBE-MAP CONSTRUCTION_FERTILITY_HEX-LARGEL	633	148	244	211	33.33%	22.91%	87	13.74%
2016 - EFFICIENT VOLUMETRIC POLYCUBE-MAP CONSTRUCTION_FERTILITY_HEX-SMALL	621	158	243	210	33.82%	23.37%	87	14.01%
2019 - SINGULARITY STRUCTURE SIMPLIFICATION OF HEXAHEDRAL MESH VIA WEIGHTED RANKING_FERTILITY_INPUT	20840	5523	8344	7105	34.09%	30.4%	2951	14.16%
2014 - L1-BASED CONSTRUCTION OF POLYCUBE MAPS FROM COMPLEX SHAPES_ANGEL_2	302	75	116	103	34.11%	23.08%	43	14.24%
2019 - SELECTIVE PADDING FOR POLYCUBE-BASED HEXAHEDRAL MESHING_DOUBLE_HINGE_NH	105	15	35	35	33.33%	6.67%	15	14.29%
2016 - POLYCUBE SIMPLIFICATION FOR COARSE LAYOUTS OF SURFACES AND VOLUMES_TABLE1_POLYCUBE_IN	195	42	93	80	41.03%	25.17%	28	14.36%
2011 - ALL-HEX MESH GENERATION VIA VOLUMETRIC POLYCUBE DEFORMATION_FERTILITY_REFINE	598	161	243	209	34.95%	24.86%	87	14.55%
2014 - L1-BASED CONSTRUCTION OF POLYCUBE MAPS FROM COMPLEX SHAPES_CANEW	879	243	357	270	30.72%	30.87%	128	14.56%
2019 - DUAL SHEET MESHING - AN INTERACTIVE APPROACH TO ROBUST HEXAHEDRALIZATION_HANGER	41	11	30	20	48.78%	15.33%	6	14.63%
2019 - SINGULARITY STRUCTURE SIMPLIFICATION OF HEXAHEDRAL MESH VIA WEIGHTED RANKING_BUSTE_INPUT	18355	4925	7667	6570	35.79%	30.83%	2722	14.63%
2012 - ALL-HEX MESHING USING SINGULARITY-RESTRICTED FIELD_BUNNY	259	52	101	93	35.91%	19.65%	39	15.06%
2019 - SELECTIVE PADDING FOR POLYCUBE-BASED HEXAHEDRAL MESHING_JOINT	119	17	42	33	27.73%	12.92%	18	15.13%
2012 - ALL-HEX MESHING USING SINGULARITY-RESTRICTED FIELD_ROD	66	9	37	27	40.91%	18.09%	10	15.15%
2019 - DUAL SHEET MESHING - AN INTERACTIVE APPROACH TO ROBUST HEXAHEDRALIZATION_JOINT	59	10	33	24	40.68%	10.37%	9	15.25%
2016 - ALL-HEX MESHING USING CLOSED-FORM INDUCED POLYCUBE_HOLLOW-EIGHT-HEX	249	61	108	76	30.52%	39.2%	38	15.26%
2019 - SINGULARITY STRUCTURE SIMPLIFICATION OF HEXAHEDRAL MESH VIA WEIGHTED RANKING_BUSTE_OUTPUT	190	45	90	82	43.16%	17.75%	29	15.26%
2016 - STRUCTURED VOLUME DECOMPOSITION VIA GENERALIZED SWEEPING_CAT_2_PADDED	19	3	19	14	73.68%	23.29%	3	15.79%
2016 - STRUCTURED VOLUME DECOMPOSITION VIA GENERALIZED SWEEPING_DOLPHIN_PADDED	19	3	19	14	73.68%	23.29%	3	15.79%
2016 - STRUCTURED VOLUME DECOMPOSITION VIA GENERALIZED SWEEPING_FEMUR1_PADDED	19	3	19	14	73.68%	23.29%	3	15.79%
2016 - STRUCTURED VOLUME DECOMPOSITION VIA GENERALIZED SWEEPING_RABBIT_PADDED	19	3	19	14	73.68%	23.29%	3	15.79%
2016 - STRUCTURED VOLUME DECOMPOSITION VIA GENERALIZED SWEEPING_ROTATELLIPSE_PADDED	19	3	19	14	73.68%	23.29%	3	15.79%
2016 - POLYCUBE SIMPLIFICATION FOR COARSE LAYOUTS OF SURFACES AND VOLUMES_ASM_MODEL_IN	200	52	80	66	33%	23.08%	32	16%
2016 - POLYCUBE SIMPLIFICATION FOR COARSE LAYOUTS OF SURFACES AND VOLUMES_ASM_POLYCUBE_IN	200	52	80	66	33%	23.08%	32	16%
2019 - SELECTIVE PADDING FOR POLYCUBE-BASED HEXAHEDRAL MESHING_BEARING	184	46	70	64	34.78%	12.73%	30	16.3%
2016 - POLYCUBE SIMPLIFICATION FOR COARSE LAYOUTS OF SURFACES AND VOLUMES_FEMUR_MODEL_OUT	110	29	57	55	50%	16.48%	18	16.36%
2014 - L1-BASED CONSTRUCTION OF POLYCUBE MAPS FROM COMPLEX SHAPES_FERTILITY	460	124	212	188	40.87%	20.33%	76	16.52%
2019 - SINGULARITY STRUCTURE SIMPLIFICATION OF HEXAHEDRAL MESH VIA WEIGHTED RANKING_PIG_OUTPUT	876	202	420	339	38.7%	28.33%	146	16.67%
2016 - ALL-HEX MESHING USING CLOSED-FORM INDUCED POLYCUBE_JOINT-HEX	59	10	31	22	37.29%	15.72%	10	16.95%
2016 - POLYCUBE SIMPLIFICATION FOR COARSE LAYOUTS OF SURFACES AND VOLUMES_CUBESPIKES_MODEL_IN	276	53	123	105	38.04%	21.02%	47	17.03%
2016 - POLYCUBE SIMPLIFICATION FOR COARSE LAYOUTS OF SURFACES AND VOLUMES_CUBESPIKES_POLYCUBE_IN	276	53	123	105	38.04%	21.02%	47	17.03%
2012 - ALL-HEX MESHING USING SINGULARITY-RESTRICTED FIELD_ELLIPSOID-A	34	7	27	14	41.18%	32.18%	6	17.65%
2019 - SINGULARITY STRUCTURE SIMPLIFICATION OF HEXAHEDRAL MESH VIA WEIGHTED RANKING_BOTTLE2_OUTPUT	318	73	175	157	49.37%	18.26%	57	17.92%
2012 - ALL-HEX MESHING USING SINGULARITY-RESTRICTED FIELD_HANGER	50	7	27	22	44%	16.08%	9	18%
2012 - ALL-HEX MESHING USING SINGULARITY-RESTRICTED FIELD_JOINT	83	21	47	28	33.73%	17.8%	15	18.07%
2017 - HEXAHEDRAL MESH GENERATION VIA CONSTRAINED QUADRILATERALIZATION_PONE.0177603.s003	83	21	47	28	33.73%	17.8%	15	18.07%
2019 - SINGULARITY STRUCTURE SIMPLIFICATION OF HEXAHEDRAL MESH VIA WEIGHTED RANKING_TOY2_INPUT	14288	3857	7161	6153	43.06%	30.76%	2585	18.09%
2016 - POLYCUBE SIMPLIFICATION FOR COARSE LAYOUTS OF SURFACES AND VOLUMES_TABLE1_POLYCUBE_OUT	149	31	86	72	48.32%	25.77%	27	18.12%
2016 - POLYCUBE SIMPLIFICATION FOR COARSE LAYOUTS OF SURFACES AND VOLUMES_FANDISK_POLYCUBE_OUT	160	46	79	67	41.88%	18.01%	29	18.13%
2019 - SINGULARITY STRUCTURE SIMPLIFICATION OF HEXAHEDRAL MESH VIA WEIGHTED RANKING_TOY1_INPUT	18883	5246	9461	8122	43.01%	29.98%	3427	18.15%
2016 - POLYCUBE SIMPLIFICATION FOR COARSE LAYOUTS OF SURFACES AND VOLUMES_FEMUR_POLYCUBE_OUT	110	30	57	55	50%	16.48%	20	18.18%
2016 - POLYCUBE SIMPLIFICATION FOR COARSE LAYOUTS OF SURFACES AND VOLUMES_BUNNY_MODEL_OUT	197	53	109	99	50.25%	13.94%	36	18.27%
2016 - POLYCUBE SIMPLIFICATION FOR COARSE LAYOUTS OF SURFACES AND VOLUMES_BUNNY_POLYCUBE_OUT	197	53	109	99	50.25%	13.94%	36	18.27%
2012 - ALL-HEX MESHING USING SINGULARITY-RESTRICTED FIELD_FANDISK	49	11	25	22	44.9%	11.61%	9	18.37%
2017 - HEXAHEDRAL MESH GENERATION VIA CONSTRAINED QUADRILATERALIZATION_FANDISK	49	11	25	22	44.9%	11.61%	9	18.37%
2017 - HEXAHEDRAL MESH GENERATION VIA CONSTRAINED QUADRILATERALIZATION_PONE.0177603.s002	49	11	25	22	44.9%	11.61%	9	18.37%
2019 - DUAL SHEET MESHING - AN INTERACTIVE APPROACH TO ROBUST HEXAHEDRALIZATION_ROCKARM	119	35	59	41	34.45%	18.12%	22	18.49%
2016 - POLYCUBE SIMPLIFICATION FOR COARSE LAYOUTS OF SURFACES AND VOLUMES_HAND_MODEL_IN	172	35	81	77	44.77%	17.77%	32	18.6%
2016 - POLYCUBE SIMPLIFICATION FOR COARSE LAYOUTS OF SURFACES AND VOLUMES_HAND_POLYCUBE_IN	172	35	81	77	44.77%	17.77%	32	18.6%
2019 - SINGULARITY STRUCTURE SIMPLIFICATION OF HEXAHEDRAL MESH VIA WEIGHTED RANKING_PIG_INPUT	13987	3768	7144	6078	43.45%	30.98%	2610	18.66%
2019 - SINGULARITY STRUCTURE SIMPLIFICATION OF HEXAHEDRAL MESH VIA WEIGHTED RANKING_BOTTLE2_INPUT	35860	9968	19360	16349	45.59%	31.63%	6816	19.01%
2016 - STRUCTURED VOLUME DECOMPOSITION VIA GENERALIZED SWEEPING_KITTEN_WITH_BIFUR_2	26	8	22	22	84.62%	10.53%	5	19.23%
2019 - SINGULARITY STRUCTURE SIMPLIFICATION OF HEXAHEDRAL MESH VIA WEIGHTED RANKING_DECKEL_OUTPUT	806	237	450	382	47.39%	24.24%	155	19.23%
2016 - POLYCUBE SIMPLIFICATION FOR COARSE LAYOUTS OF SURFACES AND VOLUMES_FEMUR_MODEL_IN	145	36	63	59	40.69%	21.74%	28	19.31%
2016 - POLYCUBE SIMPLIFICATION FOR COARSE LAYOUTS OF SURFACES AND VOLUMES_FEMUR_POLYCUBE_IN	145	36	63	59	40.69%	21.74%	28	19.31%
2016 - STRUCTURED VOLUME DECOMPOSITION VIA GENERALIZED SWEEPING_ROCKERARM_3	82	16	57	53	64.63%	22.83%	16	19.31%
2012 - ALL-HEX MESHING USING SINGULARITY-RESTRICTED FIELD_SCULPTURE-A	51	11	27	21	41.18%	12.86%	10	19.61%
2011 - ALL-HEX MESH GENERATION VIA VOLUMETRIC POLYCUBE DEFORMATION_ASM001	122	28	68	64	52.46%	14.29%	24	19.67%
2014 - L1-BASED CONSTRUCTION OF POLYCUBE MAPS FROM COMPLEX SHAPES_ROD	122	30	70	64	52.46%	14.29%	24	19.67%
2017 - EXPLICIT CYLINDRICAL MAPS FOR GENERAL TUBULAR SHAPES_CACTUS	81	21	57	51	62.96%	21.54%	16	19.75%
2014 - L1-BASED CONSTRUCTION OF POLYCUBE MAPS FROM COMPLEX SHAPES_BUSTE	361	99	203	166	45.98%	21.07%	72	19.94%
2015 - PRACTICAL HEX-MESH OPTIMIZATION VIA EDGE-CONE RECTIFICATION_HANGER_STRESSTEST_IN	50	10	28	21	42%	15.94%	10	20%
2015 - PRACTICAL HEX-MESH OPTIMIZATION VIA EDGE-CONE RECTIFICATION_HANGER_STRESSTEST_OUT	50	10	28	21	42%	15.94%	10	20%
2016 - POLYCUBE SIMPLIFICATION FOR COARSE LAYOUTS OF SURFACES AND VOLUMES_CHINESE_DRAGON_POLYCUBE_OUT	295	70	151	132	44.75%	18.73%	59	20%
2016 - POLYCUBE SIMPLIFICATION FOR COARSE LAYOUTS OF SURFACES AND VOLUMES_TEAPOT_MODEL_OUT	193	43	98	88	45.6%	21.76%	39	20.21%
2016 - POLYCUBE SIMPLIFICATION FOR COARSE LAYOUTS OF SURFACES AND VOLUMES_TEAPOT_POLYCUBE_OUT	193	43	98	88	45.6%	21.76%	39	20.21%
2016 - POLYCUBE SIMPLIFICATION FOR COARSE LAYOUTS OF SURFACES AND VOLUMES_BLOCK_MODEL_IN	162	42	109	105	64.81%	8.66%	33	20.37%
2016 - POLYCUBE SIMPLIFICATION FOR COARSE LAYOUTS OF SURFACES AND VOLUMES_BLOCK_POLYCUBE_IN	162	42	109	105	64.81%	8.66%	33	20.37%
2019 - SELECTIVE PADDING FOR POLYCUBE-BASED HEXAHEDRAL MESHING_LEG0_L0	983	236	627	604	61.44%	13.82%	205	20.85%
2019 - SINGULARITY STRUCTURE SIMPLIFICATION OF HEXAHEDRAL MESH VIA WEIGHTED RANKING_EIGHT_INPUT	3867	1076	2250	1963	50.76%	24.04%	813	21.02%
2016 - STRUCTURED VOLUME DECOMPOSITION VIA GENERALIZED SWEEPING_TWISTEDU	19	4	19	14	73.68%	23.29%	4	21.05%
2016 - SKELETON-DRIVEN ADAPTIVE HEXAHEDRAL MESHING OF TUBULAR SHAPES_ARMADILLO	301	82	180	165	54.82%	7.49%	64	21.26%
2014 - L1-BASED CONSTRUCTION OF POLYCUBE MAPS FROM COMPLEX SHAPES_BUNNY	273	73	157	129	47.25%	21.89%	59	21.61%
2015 - PRACTICAL HEX-MESH OPTIMIZATION VIA EDGE-CONE RECTIFICATION_BUNNY_IN	273	74	153	128	46.89%	20.42%	59	21.61%
2015 - PRACTICAL HEX-MESH OPTIMIZATION VIA EDGE-CONE RECTIFICATION_BUNNY_OUT	273	74	153	128	46.89%	20.42%	59	21.61%
2012 - ALL-HEX MESHING USING SINGULARITY-RESTRICTED FIELD_BONE	87	15	50	43	49.43%	29.27%	19	21.84%
2019 - SINGULARITY STRUCTURE SIMPLIFICATION OF HEXAHEDRAL MESH VIA WEIGHTED RANKING_FERTILITY_OUTPUT	310	99	222	220	70.97%	6.93%	68	21.94%
2016 - POLYCUBE SIMPLIFICATION FOR COARSE LAYOUTS OF SURFACES AND VOLUMES_TABLE2_POLYCUBE_IN	90	26	61	56	62.22%	11.51%	20	22.22%

Table C: Statistics on a dataset of hexahedral meshes. Numbers of blocks in the base complex (BC), reduced base complex (BC⁻), raw motorcycle complex (raw), reduced motorcycle complex with preserved singularity-adjacent walls (MC⁺), fully reduced motorcycle complex (MC), percentage of arcs that are T-arcs (T).

Model	BC	BC ⁻	raw	MC ⁺	MC ⁺ BC ⁻	T	MC	MC BC
2019 - SELECTIVE PADDING FOR POLYCUBE-BASED HEXAHEDRAL MESHING_CHAMFER_L4	22	5	11	11	50%	6.02%	5	22.73%
2014 - L1-BASED CONSTRUCTION OF POLYCUBE MAPS FROM COMPLEX SHAPES_KITCY	121	28	68	59	48.76%	23.13%	28	23.14%
2016 - STRUCTURED VOLUME DECOMPOSITION VIA GENERALIZED SWEEPING_ROCKERARM_2	82	17	57	53	64.63%	22.83%	19	23.17%
2019 - SINGULARITY STRUCTURE SIMPLIFICATION OF HEXAHEDRAL MESH VIA WEIGHTED RANKING_EIGHT_OUTPUT	43	6	35	35	81.4%	15%	10	23.26%
2016 - STRUCTURED VOLUME DECOMPOSITION VIA GENERALIZED SWEEPING_KITTEN_WITH_BIFUR_PADDED	82	16	57	53	64.63%	22.83%	20	24.39%
2016 - STRUCTURED VOLUME DECOMPOSITION VIA GENERALIZED SWEEPING_ROCKERARM_1	82	18	57	53	64.63%	22.83%	20	24.39%
2016 - STRUCTURED VOLUME DECOMPOSITION VIA GENERALIZED SWEEPING_HAND7_PADDED	159	36	102	91	57.23%	23.29%	39	24.53%
2019 - SELECTIVE PADDING FOR POLYCUBE-BASED HEXAHEDRAL MESHING_WRENCH	61	13	32	30	49.18%	6.48%	15	24.59%
2012 - ALL-HEX MESHING USING SINGULARITY-RESTRICTED FIELD_SCULPTURE-B	69	16	33	33	47.83%	10.17%	17	24.64%
2019 - SINGULARITY STRUCTURE SIMPLIFICATION OF HEXAHEDRAL MESH VIA WEIGHTED RANKING_TOY1_OUTPUT	144	35	113	104	72.22%	11.09%	36	25%
2019 - DUAL SHEET MESHING - AN INTERACTIVE APPROACH TO ROBUST HEXAHEDRALIZATION_BUNNY	34	7	20	17	50%	8.89%	9	26.47%
2016 - SKELETON-DRIVEN ADAPTIVE HEXAHEDRAL MESHING OF TUBULAR SHAPES_DINOPET	117	31	113	109	93.16%	5.98%	31	26.5%
2016 - SKELETON-DRIVEN ADAPTIVE HEXAHEDRAL MESHING OF TUBULAR SHAPES_BIG_BUDDY	124	36	101	88	70.97%	10.89%	33	26.61%
2016 - SKELETON-DRIVEN ADAPTIVE HEXAHEDRAL MESHING OF TUBULAR SHAPES_ROCKER_ARM	45	13	39	39	86.67%	10.34%	12	26.67%
2019 - SELECTIVE PADDING FOR POLYCUBE-BASED HEXAHEDRAL MESHING_CHAMFER_L0	29	8	18	18	62.07%	2.48%	8	27.59%
2016 - ALL-HEX MESHING USING CLOSED-FORM INDUCED POLYCUBE_KNOT-HEX	50	16	40	40	80%	15.79%	14	28%
2014 - L1-BASED CONSTRUCTION OF POLYCUBE MAPS FROM COMPLEX SHAPES_ANGEL_3	78	22	64	54	69.23%	17.8%	22	28.21%
2012 - ALL-HEX MESHING USING SINGULARITY-RESTRICTED FIELD_ELLIPSOID-B	7	2	7	7	100%	0%	2	28.57%
2012 - ALL-HEX MESHING USING SINGULARITY-RESTRICTED FIELD_ELLIPSOID-C	7	2	7	7	100%	0%	2	28.57%
2016 - SKELETON-DRIVEN ADAPTIVE HEXAHEDRAL MESHING OF TUBULAR SHAPES_WARRIOR	287	77	262	254	88.5%	5.99%	82	28.57%
2016 - SKELETON-DRIVEN ADAPTIVE HEXAHEDRAL MESHING OF TUBULAR SHAPES_BLOOD_VESSEL	52	17	48	48	92.31%	5.77%	15	28.85%
2017 - HEXAHEDRAL MESH GENERATION VIA CONSTRAINED QUADRILATERALIZATION_CUBE	17	5	16	13	76.47%	8.7%	5	29.41%
2017 - HEXAHEDRAL MESH GENERATION VIA CONSTRAINED QUADRILATERALIZATION_PONE.0177603.s001	17	5	14	13	76.47%	8.7%	5	29.41%
2012 - ALL-HEX MESHING USING SINGULARITY-RESTRICTED FIELD_DOUBLE	71	19	52	41	57.75%	25.25%	21	29.58%
2016 - SKELETON-DRIVEN ADAPTIVE HEXAHEDRAL MESHING OF TUBULAR SHAPES_CACTUS	37	11	33	33	89.19%	8.11%	11	29.73%
2016 - SKELETON-DRIVEN ADAPTIVE HEXAHEDRAL MESHING OF TUBULAR SHAPES_CLEF	37	11	33	33	89.19%	8.11%	11	29.73%
2016 - SKELETON-DRIVEN ADAPTIVE HEXAHEDRAL MESHING OF TUBULAR SHAPES_DINO	47	14	47	47	100%	0%	14	29.79%
2016 - SKELETON-DRIVEN ADAPTIVE HEXAHEDRAL MESHING OF TUBULAR SHAPES_OCTOPUS	104	30	75	69	66.35%	9.68%	31	29.81%
2016 - STRUCTURED VOLUME DECOMPOSITION VIA GENERALIZED SWEEPING_HAND7_3	67	20	46	40	59.7%	16.38%	20	29.85%
2016 - POLYCUBE SIMPLIFICATION FOR COARSE LAYOUTS OF SURFACES AND VOLUMES_HAND_MODEL_OUT	107	32	74	70	65.42%	14.33%	32	29.91%
2016 - POLYCUBE SIMPLIFICATION FOR COARSE LAYOUTS OF SURFACES AND VOLUMES_HAND_POLYCUBE_OUT	107	32	74	70	65.42%	14.33%	32	29.91%
2017 - EXPLICIT CYLINDRICAL MAPS FOR GENERAL TUBULAR SHAPES_FEMUR_SHELL1	30	8	24	22	73.33%	11.76%	9	30%
2017 - EXPLICIT CYLINDRICAL MAPS FOR GENERAL TUBULAR SHAPES_FEMUR_SHELL2	30	8	24	22	73.33%	11.76%	9	30%
2019 - SINGULARITY STRUCTURE SIMPLIFICATION OF HEXAHEDRAL MESH VIA WEIGHTED RANKING_TOY2_OUTPUT	129	34	94	88	68.22%	12.47%	39	30.23%
2019 - SELECTIVE PADDING FOR POLYCUBE-BASED HEXAHEDRAL MESHING_GEAR	85	24	46	45	52.94%	7.06%	26	30.59%
2016 - POLYCUBE SIMPLIFICATION FOR COARSE LAYOUTS OF SURFACES AND VOLUMES_CUBESPIKES_MODEL_OUT	111	28	107	101	90.99%	9.35%	34	30.63%
2016 - POLYCUBE SIMPLIFICATION FOR COARSE LAYOUTS OF SURFACES AND VOLUMES_CUBESPIKES_POLYCUBE_OUT	111	28	107	101	90.99%	9.35%	34	30.63%
2015 - PRACTICAL HEX-MESH OPTIMIZATION VIA EDGE-CONE RECTIFICATION_BLOCK_IN	100	31	100	98	98%	2.08%	31	31%
2015 - PRACTICAL HEX-MESH OPTIMIZATION VIA EDGE-CONE RECTIFICATION_BLOCK_OUT	100	31	100	98	98%	2.08%	31	31%
2015 - PRACTICAL HEX-MESH OPTIMIZATION VIA EDGE-CONE RECTIFICATION_BLOCK_STRESSTEST_IN	100	31	100	98	98%	2.08%	31	31%
2015 - PRACTICAL HEX-MESH OPTIMIZATION VIA EDGE-CONE RECTIFICATION_BLOCK_STRESSTEST_OUT	100	31	100	98	98%	2.08%	31	31%
2016 - STRUCTURED VOLUME DECOMPOSITION VIA GENERALIZED SWEEPING_HAND7_1	67	21	46	40	59.7%	17.8%	21	31.34%
2016 - STRUCTURED VOLUME DECOMPOSITION VIA GENERALIZED SWEEPING_HAND7_2	67	19	46	40	59.7%	17.8%	21	31.34%
2016 - POLYCUBE SIMPLIFICATION FOR COARSE LAYOUTS OF SURFACES AND VOLUMES_BLOCK_MODEL_OUT	100	33	100	98	98%	2.08%	33	33%
2016 - POLYCUBE SIMPLIFICATION FOR COARSE LAYOUTS OF SURFACES AND VOLUMES_BLOCK_POLYCUBE_OUT	100	33	100	98	98%	2.08%	33	33%
2019 - SYMMETRIC MOVING FRAMES_HEX_BROKENBULLET	24	7	20	17	70.83%	12.37%	8	33.33%
2016 - STRUCTURED VOLUME DECOMPOSITION VIA GENERALIZED SWEEPING_KITTEN_WITH_BIFUR_1	26	5	22	22	84.62%	10.53%	9	34.62%
2019 - DUAL SHEET MESHING - AN INTERACTIVE APPROACH TO ROBUST HEXAHEDRALIZATION_ROD	43	16	40	36	83.72%	8.18%	15	34.88%
2016 - EFFICIENT VOLUMETRIC POLYCUBE-MAP CONSTRUCTION_SPHINX_HEX-F	30	10	23	23	76.67%	11.11%	11	36.67%
2016 - SKELETON-DRIVEN ADAPTIVE HEXAHEDRAL MESHING OF TUBULAR SHAPES_FERTILITY	49	18	45	41	83.67%	15.56%	18	36.73%
2017 - EXPLICIT CYLINDRICAL MAPS FOR GENERAL TUBULAR SHAPES_FEMUR	38	12	32	30	78.95%	16.44%	14	36.84%
2016 - SKELETON-DRIVEN ADAPTIVE HEXAHEDRAL MESHING OF TUBULAR SHAPES_SANTA	42	13	40	38	90.48%	8.24%	16	38.1%
2016 - SKELETON-DRIVEN ADAPTIVE HEXAHEDRAL MESHING OF TUBULAR SHAPES_BLOCK	36	14	36	34	94.44%	5.88%	14	38.89%
2016 - POLYCUBE SIMPLIFICATION FOR COARSE LAYOUTS OF SURFACES AND VOLUMES_TABLE2_POLYCUBE_OUT	59	19	58	53	89.83%	8.62%	23	38.98%
2016 - STRUCTURED VOLUME DECOMPOSITION VIA GENERALIZED SWEEPING_CAT_2	5	2	5	5	100%	0%	2	40%
2016 - STRUCTURED VOLUME DECOMPOSITION VIA GENERALIZED SWEEPING_CAT_3	5	2	5	5	100%	0%	2	40%
2016 - STRUCTURED VOLUME DECOMPOSITION VIA GENERALIZED SWEEPING_DOLPHIN_1	5	2	5	5	100%	0%	2	40%
2016 - STRUCTURED VOLUME DECOMPOSITION VIA GENERALIZED SWEEPING_DOLPHIN_2	5	2	5	5	100%	0%	2	40%
2016 - STRUCTURED VOLUME DECOMPOSITION VIA GENERALIZED SWEEPING_DOLPHIN_3	5	2	5	5	100%	0%	2	40%
2016 - STRUCTURED VOLUME DECOMPOSITION VIA GENERALIZED SWEEPING_FEMUR1_2	5	2	5	5	100%	0%	2	40%
2016 - STRUCTURED VOLUME DECOMPOSITION VIA GENERALIZED SWEEPING_FEMUR1_3	5	2	5	5	100%	0%	2	40%
2016 - STRUCTURED VOLUME DECOMPOSITION VIA GENERALIZED SWEEPING_KITTEN_2	5	2	5	5	100%	40%	2	40%
2016 - STRUCTURED VOLUME DECOMPOSITION VIA GENERALIZED SWEEPING_RABBIT_2	5	2	5	5	100%	0%	2	40%
2016 - STRUCTURED VOLUME DECOMPOSITION VIA GENERALIZED SWEEPING_RABBIT_3	5	2	5	5	100%	0%	2	40%
2017 - EXPLICIT CYLINDRICAL MAPS FOR GENERAL TUBULAR SHAPES_CYLINDER_MIXED	7	3	7	7	100%	0%	3	42.86%
2017 - EXPLICIT CYLINDRICAL MAPS FOR GENERAL TUBULAR SHAPES_CYLINDER_MIXED_W_TORSION	7	3	7	7	100%	0%	3	42.86%
2019 - DUAL SHEET MESHING - AN INTERACTIVE APPROACH TO ROBUST HEXAHEDRALIZATION_BONE	16	6	12	12	75%	4.26%	7	43.75%
2016 - STRUCTURED VOLUME DECOMPOSITION VIA GENERALIZED SWEEPING_BUNNY_1	18	8	16	16	88.89%	6.74%	8	44.44%
2016 - STRUCTURED VOLUME DECOMPOSITION VIA GENERALIZED SWEEPING_BUNNY_2	18	8	16	16	88.89%	6.74%	8	44.44%
2016 - STRUCTURED VOLUME DECOMPOSITION VIA GENERALIZED SWEEPING_BUNNY6_1	18	8	16	16	88.89%	6.74%	8	44.44%
2016 - STRUCTURED VOLUME DECOMPOSITION VIA GENERALIZED SWEEPING_BUNNY6_2	18	8	16	16	88.89%	6.74%	8	44.44%
2016 - STRUCTURED VOLUME DECOMPOSITION VIA GENERALIZED SWEEPING_BUNNY6_3	18	8	16	16	88.89%	6.74%	8	44.44%
2019 - SELECTIVE PADDING FOR POLYCUBE-BASED HEXAHEDRAL MESHING_COLUMN	18	8	18	17	94.44%	3.85%	8	44.44%
2016 - ALL-HEX MESHING USING CLOSED-FORM INDUCED POLYCUBE_NUT-HEX	12	6	12	12	100%	0%	6	50%
2019 - SYMMETRIC MOVING FRAMES_HEX_TETRAHEDRON	4	2	4	4	100%	0%	2	50%
2017 - EXPLICIT CYLINDRICAL MAPS FOR GENERAL TUBULAR SHAPES_SPRING	7	4	7	7	100%	0%	4	57.14%
2016 - ALL-HEX MESHING USING CLOSED-FORM INDUCED POLYCUBE_FANCY_RING-HEX	5	3	5	5	100%	14.29%	3	60%
2016 - STRUCTURED VOLUME DECOMPOSITION VIA GENERALIZED SWEEPING_CAT_1	5	3	5	5	100%	0%	3	60%
2016 - STRUCTURED VOLUME DECOMPOSITION VIA GENERALIZED SWEEPING_FEMUR1_1	5	3	5	5	100%	0%	3	60%
2016 - STRUCTURED VOLUME DECOMPOSITION VIA GENERALIZED SWEEPING_KITTEN_1	5	3	5	5	100%	40%	3	60%
2016 - STRUCTURED VOLUME DECOMPOSITION VIA GENERALIZED SWEEPING_RABBIT_1	5	3	5	5	100%	0%	3	60%
2019 - DUAL SHEET MESHING - AN INTERACTIVE APPROACH TO ROBUST HEXAHEDRALIZATION_DOUBLE-TORUS	5	3	5	5	100%	0%	3	60%
2017 - EXPLICIT CYLINDRICAL MAPS FOR GENERAL TUBULAR SHAPES_FEMUR_SHELL0	8	5	8	8	100%	0%	5	62.5%
2016 - ALL-HEX MESHING USING CLOSED-FORM INDUCED POLYCUBE_KPDLOEKR-HEX	2	2	2	2	100%	38.46%	2	100%
2017 - EXPLICIT CYLINDRICAL MAPS FOR GENERAL TUBULAR SHAPES_CYLINDER_GRID	1	1	1	1	100%	0%	1	100%
2017 - EXPLICIT CYLINDRICAL MAPS FOR GENERAL TUBULAR SHAPES_CYLINDER_POLAR	1	1	1	1	100%	0%	1	100%
2018 - FUZZY CLUSTERING BASED PSEUDO-SWEPT VOLUME DECOMPOSITION FOR HEXAHEDRAL MESHING_EXAMPLE_5	1	1	1	1	100%	0%	1	100%

Table C: Statistics on a dataset of hexahedral meshes. Numbers of blocks in the base complex (BC), reduced base complex (BC⁻), raw motorcycle complex (raw), reduced motorcycle complex with preserved singularity-adjacent walls (MC⁺), fully reduced motorcycle complex (MC), percentage of arcs that are T-arcs (T).

