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Hexahedral Mesh Quality Improvement via Edge-Angle Optimization

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ABSTRACT

Supplementary Material

Our method can successfully optimize over 50 octree-based meshes, The results are showed in the following tables.

Table 1. Improving Quality of hex-meshes Octree-based method. We use metro tools to compute Hausdorff distance wrt. bounding box diagonal [1]. For each model, the first and second row is input and output, respectively.

Model	#hexes	Err	MSJ	ASJ
airplane1	4972		0.030	0.838
airplane1	4972	0.004393	0.508	0.879
airplane2	6118		0.018	0.848
airplane2	6118	0.003137	0.500	0.882
armadillo	19940		0.013	0.822
armadillo	19940	0.005380	0.238	0.839
armchair	18756		0.157	0.805
armchair	18756	0.002698	0.166	0.824
bimba	25347		0.0609	0.799
bimba	25347	0.007841	0.113	0.816
bird	4247		0.0313	0.820
bird	4247	0.011580	0.553	0.868
blade	10996		0.025	0.845
blade	10996	0.007911	0.312	0.868
block	1624		0.179	0.661
block	1624	0.016877	0.550	0.815
bone	2751		0.154	0.781
bone	2751	0.006475	0.207	0.794

Table 2. Improving Quality of hex-meshes Octree-based method. We use metro tools to compute Hausdorff distance wrt. bounding box diagonal [1]. For each model, the first and second row is input and output, respectively.

Model	#hexes	Err	MSJ	ASJ
botijo	15244		0.012	0.786
botijo	15244	0.012756	0.121	0.813
bottle1	10026		0.022	0.801
bottle1	10026	0.046987	0.075	0.796
bottle2	35886		0.129	0.79
bottle2	35886	0.011387	0.200	0.809
bumpy sphere	9903		0.138	0.771
bumpy sphere	9903	0.002958	0.174	0.794
bumpy torus	45619		0.0859	0.811
bumpy torus	45619	0.004873	0.102	0.825
bunny	27670		0.016	0.796
bunny	27670	0.007097	0.106	0.813
buste	19075		0.133	0.852
buste	19075	0.004503	0.161	0.862
camel	12874		0.014	0.779
camel	12874	0.006154	0.201	0.821
camille hand	12247		0.0239	0.812
camille hand	12247	0.005111	0.233	0.829
carter	33202		0.022	0.815
carter	33202	0.006637	0.102	0.830
chair	5464		0.014	0.744
chair	5464	0.013805	0.301	0.819
chair1	11686		0.018	0.843
chair1	11686	0.003276	0.313	0.859
chinese lion	43174		0.029	0.825
chinese lion	43174	0.005000	0.115	0.843
coverrear	37796		0.00849	0.783
coverrear	37796	0.002440	0.056	0.821

⋆Only capitalize first word and proper nouns in the title.

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Table 3. Improving Quality of hex-meshes Octree-based method. We use metro tools to compute Hausdorff distance wrt. bounding box diagonal [1]. For each model, the first and second row is input and output, respectively.

Model	#hexes	Err	MSJ	ASJ
cup	48341		0.028	0.866
cup	48341	0.005255	0.138	0.874
cup1	36235		0.130	0.820
cup1	36235	0.003580	0.303	0.829
dancer	1473		0.011	0.777
dancer	1473	0.007419	0.553	0.852
dancer2	1385		0.013	0.722
dancer2	1385	0.016464	0.465	0.821
dancing children	25691		0.016	0.842
dancing children	25691	0.005184	0.103	0.856
david	52905		0.012	0.821
david	52905	0.008832	0.106	0.843
deckel	53658		0.0278	0.840
deckel	53658	0.002021	0.0296	0.864
deformed armadillo	25294		0.013	0.834
deformed armadillo	25294	0.008370	0.112	0.850
dente	13655		0.081	0.789
dente	13655	0.010161	0.115	0.806
dilo	4181		0.012	0.824
dilo	4181	0.007767	0.456	0.871
dino	8293		0.00575	0.742
dino	8293	0.013066	0.211	0.820
dino2	8799		0.023	0.794
dino2	8799	0.005613	0.219	0.816
dragon stand	24009		0.015	0.832
dragon stand	24009	0.004775	0.101	0.848
dragonstand2	23917		0.013	0.837
dragonstand2	23917	0.004598	0.304	0.857
dtorus	16065		0.151	0.82
dtorus	16065	0.001817	0.169	0.833
duck	4743		0.031	0.808
duck	4743	0.007509	0.239	0.820
duck2	72041		0.0237	0.795
duck2	72041	0.003092	0.159	0.815
eight	4571		0.169	0.781
eight	4571	0.004370	0.201	0.799
eros	25956		0.092	0.820
eros	25956	0.006504	0.115	0.836
fandisk	8941		0.0087	0.705
fandisk	8941	0.003459	0.010	0.753
fertility	21370		0.105	0.845
fertility	21370	0.001644	0.136	0.858
fish1	9537		0.015	0.815
fish1	9537	0.008377	0.308	0.845
fish2	7439		0.012	0.811
fish2	7439	0.009266	0.018	0.808
foot	4724		0.180	0.820
foot	4724	0.012382	0.302	0.835
gargoyle	41610		0.024	0.834
gargoyle	41610	0.005247	0.200	0.849
genus3	21468		0.013	0.790
genus3	21468	0.007322	0.114	0.807

Table 4. Improving Quality of hex-meshes Octree-based method. We use metro tools to compute Hausdorff distance wrt. bounding box diagonal [1]. For each model, the first and second row is input and output, respectively.

Model	#hexes	Err	MSJ	ASJ
glass1	5233		0.006	0.707
glass1	5233	0.003856	0.310	0.812
glass2	1855		0.011	0.678
glass2	1855	0.006310	0.301	0.780
grayloc	46490		0.008	0.844
grayloc	46490	0.004810	0.010	0.861
greek sculpture	9848		0.012	0.856
greek sculpture	9848	0.005529	0.138	0.874
hand	8170		0.0113	0.782
hand	8170	0.004134	0.108	0.810
head1	17433		0.121	0.816
head1	17433	0.004628	0.177	0.833
head2	27128		0.0195	0.796
head2	27128	0.006985	0.126	0.818
holes3	10140		0.274	0.827
holes3	10140	0.008802	0.305	0.836
homer	11690		0.026	0.830
homer	11690	0.005281	0.236	0.845
horse	12159		0.0123	0.796
horse	12159	0.203218	0.024	0.816
human1	7075		0.016	0.820
human1	7075	0.006544	0.450	0.863
human2	5363		0.014	0.782
human2	5363	0.022624	0.015	0.788
igea	21661		0.026	0.785
igea	21661	0.007184	0.129	0.803
insect	6780		0.008	0.805
insect	6780	0.006364	0.301	0.846
isidore horse	21695		0.017	0.830
isidore horse	21695	0.005455	0.120	0.849
joint	10118		0.020	0.811
joint	10118	0.001245	0.054	0.848
kiss	18418		0.027	0.844
kiss	18418	0.005075	0.224	0.857
kitten	12713		0.115	0.766
kitten	12713	0.010022	0.146	0.784
lion recon	11922		0.016	0.846
lion recon	11922	0.005836	0.204	0.862
master cylinder	55345		0.025	0.837
master cylinder	55345	0.004908	0.127	0.847
max	17161		0.062	0.799
max	17161	0.008424	0.119	0.815
moai	7320		0.192	0.820
moai	7320	0.009869	0.220	0.836
mouse	25110		0.0804	0.8
mouse	25110	0.003043	0.137	0.821
octa flower	26469		0.0116	0.746
octa flower	26469	0.005229	0.0124	0.782
oil pump	40227		0.0105	0.798
oil pump	40227	0.004835	0.072	0.819
oni	24787		0.036	0.819
oni	24787	0.006529	0.145	0.835

References

[1] Guthe, M, Borodin, P, Klein, R. Fast and accurate hausdorff distance calculation between meshes. In: In WSCG. 2; 2005, p. 41–48.

Table 5. Improving Quality of hex-meshes Octree-based method. We use metro tools to compute Hausdorff distance wrt. bounding box diagonal [1]. For each model, the first and second row is input and output, respectively.

Model	#hexes	Err	MSJ	ASJ
part	8266		0.070	0.770
part	8266	0.010065	0.106	0.811
pear	4470		0.220	0.787
pear	4470	0.001373	0.238	0.803
pig	13987		0.021	0.793
pig	13987	0.005379	0.107	0.811
plate	15710		0.0214	0.804
plate	15710	0.484713	0.0254	0.844
red circular box	12247		0.0239	0.812
red circular box	12247	0.005111	0.233	0.829
retinal	6811		0.117	0.758
retinal	6811	0.003071	0.131	0.782
rocker	16608		0.108	0.865
rocker	16608	0.007742	0.241	0.874
rod	3675		0.037	0.770
rod	3675	0.009317	0.203	0.804
rolling stage	42182		0.030	0.828
rolling stage	42182	0.004066	0.127	0.842
santa	18000		0.0225	0.854
santa	18000	0.003881	0.453	0.865
screwdriver	8299		0.008	0.844
screwdriver	8299	0.004890	0.249	0.868
sculpt	20572		0.017	0.714
sculpt	20572	0.012328	0.052	0.758
sediapatch	28379		0.123	0.812
sediapatch	28379	0.007175	0.127	0.824
teaport	16888		0.022	0.793
teaport	16888	0.005232	0.108	0.810
thai statue	14635		0.013	0.852
thai statue	14635	0.006430	0.403	0.878
toy1	18947		0.121	0.806
toy1	18947	0.001506	0.201	0.823
uu-memento	19424		0.0165	0.802
uu-memento	19424	0.002022	0.0296	0.864
venus	4421		0.174	0.778
venus	4421	0.002827	0.226	0.798
woodenfish	19709		0.010	0.796
woodenfish	19709	0.008136	0.210	0.826
wrench	2097		0.0098	0.286
wrench	2097	0.004929	0.0174	0.513