

Structured Volume Decomposition via Generalized Sweeping

Supplemental material - table of the performance report and mesh statistics

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TABLE 1

Statistics of hex-meshes with multi-resolutions. The subscripts of models, e.g., w1u2v2, indicates the initial numbers of samples in the W , U , and V directions are 1, 2, 2, respectively, excluding the corner points; *Comp* is the abbreviation of “Component”. We measure the total timings of the whole pipeline excepting the harmonics function design part in minutes. For all the meshes shown in the paper, $\epsilon = 1.5$, and the number of iterations for corner point alignment is 100. The hex-mesh quality is measured by the length, volume (average/standard deviation) and scaled Jacobians (average/minimum), respectively.

Models	#Hex	Meshing	Length	Volume	Scaled Jacobian	#Slice	#Comp
Bunny _{w1u2v2}	264	20min	0.537/0.172	0.417/0.793	0.681/0.137	19	18
Bunny _{w2u6v6}	4764	53min	0.271/0.030	0.050/0.083	0.840/0.091	51	18
Bunny _{w3u16v16}	69984	145min	0.084/0.004	0.002/0.004	0.891/0.108	141	18
Bunny _{6w1u2v2}	304	24min	0.621/0.212	0.628/1.159	0.677/0.079	22	18
Bunny _{6w2u6v6}	4932	56min	0.266/0.029	0.048/0.080	0.839/0.046	53	18
Bunny _{6w3u16v16}	76096	159min	0.101/0.005	0.003/0.006	0.885/0.046	154	18
Dolphin _{m1n1o1}	60	13min	0.529/0.170	0.153/0.187	0.574/0.013	13	5
Dolphin _{w2u6v6}	4788	58min	0.128/0.003	0.003/0.003	0.876/0.034	58	5
Dolphin _{w3u16v16}	38976	85min	0.070/0.001	0.0004/0.0003	0.823/0.046	88	5
Dolphin* _{w3u16v16}	45440	-	-	-	0.816/0.069	-	19
Femur _{w1u2v2}	180	17min	1.049/0.226	1.337/1.198	0.722/0.014	16	5
Femur _{w2u6v6}	3528	44min	0.394/0.014	0.0814/0.078	0.889/0.043	43	5
Femur _{w3u16v16}	39424	90min	0.177/0.003	0.007/0.007	0.918/0.099	89	5
Femur* _{w3u16v16}	45952	-	-	-	0.925/0.080	-	19
Kitten _{w1u2v2}	300	22min	0.566/0.203	0.450/0.992	0.748/0.357	25	5
Kitten _{w2u5v5}	3445	50min	0.257/0.036	0.046/0.105	0.866/0.257	53	5
Kitten _{w3u16v16}	90048	200min	0.083/0.004	0.002/0.005	0.932/0.136	201	5
Kitten-2 _{w1u2v2}	204	15min	0.709/0.193	0.484/0.601	0.536/0.031	15	26
Kitten-2 _{w2u6v6}	2928	30min	0.325/0.028	0.053/0.062	0.774/0.056	32	26
Kitten-2 _{w3u16v16}	34880	71min	0.148/0.006	0.005/0.006	0.823/0.056	74	26
Kitten-2 ⁺ _{w3u12v12}	17392	71min	0.096/0.002	0.001/0.001	0.912/0.240	74	82
Sculpture _{w1u2v2}	312	24min	0.784/0.137	0.400/0.227	0.672/0.059	24	18
Sculpture _{w2u6v6}	7248	83min	0.263/0.010	0.021/0.014	0.859/0.047	82	18
Sculpture _{w3u16v16}	75456	165min	0.122/0.002	0.002/0.001	0.908/0.012	162	18
Sculpture* _{w3u16v16}	87776	-	-	-	0.90/0.166	-	50
Torus _{w1u2v2}	216	1min	0.285/0.008	0.024/0.01	0.829/0.768	18	5
Torus _{w2u6v6}	3888	2min	0.120/0.003	0.002/0.0003	0.930/0.796	36	5
Torus _{w2u16v16}	13824	2min	0.083/0.003	0.0004/0.0004	0.941/0.779	36	5
Deformed-Torus _{w1u1v1}	50	5min	1.138/0.266	1.016/0.584	0.632/0.488	10	5
Deformed-Torus _{w2u6v6}	3192	32min	0.313/0.010	0.035/0.016	0.917/0.665	38	5
Deformed-Torus _{w3u16v16}	66752	136min	0.111/0.001	0.002/0.0006	0.965/0.655	149	5
Twisted-Ellipse _{w2u5v12}	5692	3min	0.189/0.001	0.008/0.003	0.903/0.668	18	19
U-shape _{w2u5v12}	14992	12min	0.189/0.004	0.008/0.005	0.902/0.584	18	19

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TABLE 2

Statistics of hex-meshes with multi-resolutions (**continued**). The subscripts of models, e.g., w1u2v2, indicates the initial numbers of samples in the W , U , and V directions are 1, 2, 2, respectively, excluding the corner points; $Comp$ is the abbreviation of ‘‘Component’’. We measure the total timings of the whole pipeline excepting the harmonics function design part in minutes. For all the meshes shown in the paper, $\epsilon = 1.5$, and the number of iterations for corner point alignment is 100. The hex-mesh quality is measured by the length, volume (average/standard deviation) and scaled Jacobians (average/minimum), respectively.

Models	#Hex	Meshing	Length	Volume	Scaled Jacobian	#Slice	#Comp
Cat _{w1u2v2}	96	2min	0.843/0.164	0.731/0.639	0.710/0.117	9	5
Cat _{w2u6v6}	2604	15min	0.280/0.013	0.033/0.034	0.858/0.046	32	5
Cat _{w3u16v16}	27776	21min	0.127/0.002	0.003/0.003	0.901/0.0323	63	5
Cat* _{w2u6v6}	3516	-	-	-	0.838/0.072	-	19
Rabbit _{w1u2v2}	168	13min	0.453/0.046	0.120/0.112	0.703/0.193	15	5
Rabbit _{w2u6v6}	2352	25min	0.184/0.007	0.010/0.010	0.863/0.114	29	5
Rabbit _{w3u16v16}	49728	118min	0.066/0.0007	0.0004/0.0004	0.908/0.047	112	5
Rabbit* _{w2u6v6}	3192	-	-	-	0.860/0.168	-	19
Hand _{w1u2v10}	956	24min	0.236/0.010	0.017/0.013	0.798/0.103	26	60
Hand _{w1u4v20}	4984	83min	0.136/0.002	0.003/0.002	0.881/0.226	83	60
Hand _{w3u16v16}	29440	190min	0.075/0.0009	0.0006/0.0004	0.902/0.127	181	159
Hand* _{w3u16v16}	38592	-	-	-	0.916/0.183	-	60
Fertility ⁺ _{w2u6v6}	3120	60min	0.110/0.003	0.001/0.001	0.766/0.179	50	300
Fertility ⁺ _{w3u12v12}	20240	115min	0.058/0.0006	0.0002/0.0002	0.828/0.182	100	300
Fertility ⁺ _{w5u24v24}	143040	209min	0.030/0.0001	0.00003/0.00004	0.857/0.130	200	300
Blade ⁺ _{w1u3v2}	648	29min	0.207/0.010	0.009/0.008	0.687/0.060	24	22
Blade ⁺ _{w2u6v4}	3504	56min	0.112/0.003	0.002/0.002	0.776/0.034	48	22
Blade ⁺ _{w3u12v8}	28032	106min	0.056/0.001	0.0002/0.0002	0.820/0.048	96	22
Rocker-arm ⁺ _{w2u5v3}	1749	35min	0.187/0.012	0.007/0.008	0.752/0.085	31	82
Rocker-arm ⁺ _{w3u10v6}	11368	71min	0.096/0.003	0.001/0.001	0.826/0.110	62	82
Rocker-arm ⁺ _{w5u20v12}	80448	127min	0.050/0.0007	0.0002/0.0002	0.855/0.097	124	82

⁺ and * denote the hex-mesh are undergone bifurcation splitting and padding process, respectively. Note that all the three resolutions of our meshes have positive minimum and high average Jacobians.