

Grid: ALUSimplexGrid

Macrogrid: grid3d.dgf

Problem: AdvectDiff

Epsilon = 0

Exact solution:  $u(x, y, z, t) := \sum_{i=0}^1 v_i(t) \cdot \mu_i(x) \cdot \nu_i(y) \cdot \omega_i(z)$

$$v_0(t) := e^{-\varepsilon t \pi^2 (2^2 + 1^2 + 1.3^2)}$$

$$\mu_0(x) := 0.6 \cdot \cos(2\pi(x - at)) + 0.8 \cdot \sin(2\pi(x - at))$$

$$\nu_0(y) := 1.2 \cdot \cos(1\pi(y - at)) + 0.4 \cdot \sin(1\pi(y - at))$$

$$\omega_0(z) := 0.1 \cdot \cos(1.3\pi(z - at)) + -0.4 \cdot \sin(1.3\pi(z - at))$$

$$v_1(t) := e^{-\varepsilon t \pi^2 (0.7^2 + 0.5^2 + 0.1^2)}$$

$$\mu_1(x) := 0.9 \cdot \cos(0.7\pi(x - at)) + 0.2 \cdot \sin(0.7\pi(x - at))$$

$$\nu_1(y) := 0.3 \cdot \cos(0.5\pi(y - at)) + 0.1 \cdot \sin(0.5\pi(y - at))$$

$$\omega_1(z) := -0.3 \cdot \cos(0.1\pi(z - at)) + 0.2 \cdot \sin(0.1\pi(z - at))$$

Dimension: 3 Polynomial order: 0 Epsilon: 0

Size	$\ u - u_h\ _{L_2}$	EOC	CPU	#Iterations	a-dt
384	0.101208	—	0.048003	11	0.046875
3072	0.0622934	0.700169	0.460029	22	0.0255682
24576	0.0350955	0.827792	8.0045	43	0.0123134
196608	0.0188658	0.895512	125.116	86	0.00600255
1572864	0.00981048	0.943379	1949.67	171	0.00296479

Dimension: 3 Polynomial order: 0 Epsilon: 0.001

Size	$\ u - u_h\ _{L_2}$	EOC	CPU	#Iterations	a-dt
48	0.140852	—	0.008001	6	0.09375
384	0.0915146	0.62211	0.040002	11	0.0553977
3072	0.0547169	0.742016	0.46803	22	0.0259556
24576	0.0301517	0.859745	8.14451	43	0.0123224
196608	0.0185556	0.700384	314.972	219	0.00234508

Dimension: 3 Polynomial order: 0 Epsilon: 0.003

Size	$\ u - u_h\ _{L_2}$	EOC	CPU	#Iterations	a-dt
48	0.130856	—	0.004001	6	0.09375
384	0.0846666	0.62811	0.040002	11	0.0553977
3072	0.050536	0.744482	0.46003	22	0.0259556
24576	0.031161	0.697571	14.8769	82	0.00642005
196608	0.0193845	0.684839	928.598	656	0.000772726

Dimension: 3 Polynomial order: 0 Epsilon: 0.01

Size	$\ u - u_h\ _{L_2}$	EOC	CPU	#Iterations	a-dt
48	0.101449	—	0.004	6	0.09375
384	0.0654052	0.633278	0.044003	11	0.0553977
3072	0.0423718	0.626301	0.700043	35	0.0162312
24576	0.0284109	0.576661	48.599	274	0.00189029
196608	0.0186385	0.608155	3082.66	2185	0.000229747

Dimension: 3 Polynomial order: 0 Epsilon: 0.03

Size	$\ u - u_h\ _{L_2}$	EOC	CPU	#Iterations	a-dt
48	0.0506689	—	0.008001	6	0.09375
384	0.0349927	0.534046	0.048003	13	0.046274
3072	0.0253075	0.467493	1.92812	103	0.00533208
24576	0.0182391	0.472529	143.089	820	0.000616854
196608	0.0137834	0.404098	9174.74	6554	7.63881e-05

Dimension: 3 Polynomial order: 0 Epsilon: 0.1

Size	$\ u - u_h\ _{L_2}$	EOC	CPU	#Iterations	a-dt
48	0.0128228	—	0.008001	6	0.09375
384	0.00666792	0.943405	0.120007	43	0.013899
3072	0.00508434	0.391177	6.26439	342	0.00150548
24576	0.00422843	0.265938	478.534	2731	0.000183657
196608	0.00372646	0.182316	30775.5	21846	2.28966e-05

Dimension: 3 Polynomial order: 1 Epsilon: 0

Size	$\ u - u_h\ _{L_2}$	EOC	CPU	#Iterations	a-dt
48	0.0867993	—	0.180011	73	0.00694444
384	0.0356294	1.28461	2.38415	145	0.00352011
3072	0.0101431	1.81256	36.0663	289	0.00174829

Dimension: 3 Polynomial order: 1 Epsilon: 0.001

Size	$\ u - u_h\ _{L_2}$	EOC	CPU	#Iterations	a-dt
48	0.0837132	—	0.184012	73	0.00694444
384	0.0338899	1.3046	2.43615	145	0.00352011
3072	0.00896572	1.91836	36.9463	289	0.00174829

Dimension: 3 Polynomial order: 1 Epsilon: 0.003

Size	$\ u - u_h\ _{L_2}$	EOC	CPU	#Iterations	a-dt
48	0.0780028	—	0.180012	73	0.00694444
384	0.0312506	1.31964	2.48815	145	0.00352011
3072	0.00809844	1.94817	37.3503	289	0.00174829

Dimension: 3 Polynomial order: 1 Epsilon: 0.01

Size	$\ u - u_h\ _{L_2}$	EOC	CPU	#Iterations	a-dt
48	0.0616269	—	0.184012	73	0.00694444
384	0.0250748	1.29732	2.43615	145	0.00352011
3072	0.0068933	1.86297	118.723	922	0.000546353

Dimension: 3 Polynomial order: 1 Epsilon: 0.03

Size	$\ u - u_h\ _{L_2}$	EOC	CPU	#Iterations	a-dt
48	0.0328507	—	0.192012	73	0.00694444
384	0.0145814	1.17179	5.83237	346	0.00146683
3072	0.0046375	1.65271	354.766	2765	0.000181375

Dimension: 3 Polynomial order: 1 Epsilon: 0.1

Size	$\ u - u_h\ _{L_2}$	EOC	CPU	#Iterations	a-dt
48	0.00516556	—	0.340021	145	0.00347222
384	0.00242686	1.08983	19.4892	1152	0.000437042
3072	0.000888506	1.44964	1178.6	9217	5.43009e-05

Dimension: 3 Polynomial order: 2 Epsilon: 0

Size	$\ u - u_h\ _{L_2}$	EOC	CPU	#Iterations	a-dt
6	0.0993688	—	0.064004	40	0.0125
48	0.043128	1.20417	1.5721	161	0.00320264
384	0.00835722	2.36753	23.7975	320	0.00157251

Dimension: 3 Polynomial order: 2 Epsilon: 0.001

Size	$\ u - u_h\ _{L_2}$	EOC	CPU	#Iterations	a-dt
6	0.0955583	—	0.072005	40	0.0125
48	0.0414558	1.20481	1.5721	161	0.00320264
384	0.00760943	2.44571	23.9975	320	0.00157251

Dimension: 3 Polynomial order: 2 Epsilon: 0.003

Size	$\ u - u_h\ _{L_2}$	EOC	CPU	#Iterations	a-dt
6	0.0885916	—	0.068005	40	0.0125
48	0.0386544	1.19654	1.5801	161	0.00320264
384	0.00681752	2.50331	24.3255	320	0.00157251

Dimension: 3 Polynomial order: 2 Epsilon: 0.01

Size	$\ u - u_h\ _{L_2}$	EOC	CPU	#Iterations	a-dt
6	0.0694619	—	0.072005	40	0.0125
48	0.0311287	1.15798	1.6081	161	0.00320264
384	0.00537527	2.53384	30.1139	385	0.0013104

Dimension: 3 Polynomial order: 2 Epsilon: 0.03

Size	$\ u - u_h\ _{L_2}$	EOC	CPU	#Iterations	a-dt
6	0.0387647	—	0.072004	40	0.0125
48	0.0171846	1.17363	1.6041	161	0.00320264
384	0.00297235	2.53144	86.1454	1152	0.000436808

Dimension: 3 Polynomial order: 2 Epsilon: 0.1

Size	$\ u - u_h\ _{L_2}$	EOC	CPU	#Iterations	a-dt
6	0.00784461	—	0.096006	61	0.00833333
48	0.0022075	1.82929	4.7323	481	0.00105899
384	0.000373364	2.56376	292.374	3841	0.000130484

Dimension: 3 Polynomial order: 3 Epsilon: 0

Size	$\ u - u_h\ _{L_2}$	EOC	CPU	#Iterations	a-dt
6	0.0783643	—	0.900056	168	0.00297619
48	0.0193464	2.01813	26.9777	673	0.00074847
384	0.00274214	2.8187	420.482	1344	0.000372581

Dimension: 3 Polynomial order: 3 Epsilon: 0.001

Size	$\ u - u_h\ _{L_2}$	EOC	CPU	#Iterations	a-dt
6	0.0751837	—	0.944059	168	0.00297619
48	0.0179037	2.07016	27.3977	673	0.00074847
384	0.00202478	3.14442	422.298	1344	0.000372581

Dimension: 3 Polynomial order: 3 Epsilon: 0.003

Size	$\ u - u_h\ _{L_2}$	EOC	CPU	#Iterations	a-dt
6	0.0696296	—	0.924057	168	0.00297619
48	0.0162651	2.09792	27.4817	673	0.00074847
384	0.00170921	3.25038	450.204	1344	0.000372581

Dimension: 3 Polynomial order: 3 Epsilon: 0.01

Size	$\ u - u_h\ _{L_2}$	EOC	CPU	#Iterations	a-dt
6	0.0549045	—	0.95206	168	0.00297619
48	0.0127484	2.10661	27.3497	673	0.00074847
384	0.00126857	3.32905	675.238	2151	0.000232863

Dimension: 3 Polynomial order: 3 Epsilon: 0.03

Size	$\ u - u_h\ _{L_2}$	EOC	CPU	#Iterations	a-dt
6	0.0297347	—	0.924057	168	0.00297619
48	0.00681148	2.12611	33.4061	807	0.000623728
384	0.000639314	3.41337	2024.91	6452	7.76016e-05

Dimension: 3 Polynomial order: 3 Epsilon: 0.1

Size	$\ u - u_h\ _{L_2}$	EOC	CPU	#Iterations	a-dt
6	0.0047012	—	1.83211	337	0.0014881
48	0.000801877	2.55158	109.639	2688	0.000186566
384	6.66402e-05	3.58892	6898.81	21505	2.32602e-05

Total time: 2075.18