Sample SIMPLE output after one complete iteration

Initial guesses for *u*, *v*, and *p*
u = 0.001 m/s
v = 0.0001 m/s
p = 0.001 Pa

Number of nodes
u   5 in horizontal direction, 4 in vertical direction (inlet *u* node is directly on the boundary)
v   6 in horizontal direction, 5 in vertical direction (left-most *v* node is staggered upstream of the inlet *u* node, so it is just upstream of the boundary; similarly, right-most *v* node is just downstream of the outlet boundary)
p   4 in horizontal direction, 4 in vertical direction (all within the boundaries; no pressure nodes outside of the boundaries)

Under-relaxation
α = 0.5

Output After 1st Iteration
A_u (note that primary coefficient terms have been under-relaxed as per the LHS of Eq. 6.36)

1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
-0.0027	0.0358	-0.0002	0	0	0	-0.005	0	0	0	0	0	0	0	0	0	0	0	0	0
0	-0.0027	0.0358	-0.0002	0	0	0	-0.005	0	0	0	0	0	0	0	0	0	0	0	0
0	0	-0.0027	0.0358	-0.0002	0	0	0	-0.005	0	0	0	0	0	0	0	0	0	0	0
0	0	0	-1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	-0.0063	0	0	0	-0.0027	0.0283	-0.0002	0	0	0	-0.005	0	0	0	0	0	0	0	0
0	0	-0.0063	0	0	0	-0.0027	0.0283	-0.0002	0	0	0	-0.005	0	0	0	0	0	0	0
0	0	0	-0.0063	0	0	0	-0.0027	0.0283	-0.0002	0	0	0	-0.005	0	0	0	0	0	0
0	0	0	0	0	0	0	0	-1	1	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	-0.0063	0	0	0	-0.0027	0.0283	-0.0002	0	0	0	-0.005	0	0	0
0	0	0	0	0	0	0	-0.0063	0	0	0	-0.0027	0.0283	-0.0002	0	0	0	-0.005	0	0
0	0	0	0	0	0	0	0	-0.0063	0	0	0	-0.0027	0.0283	-0.0002	0	0	0	-0.005	0
0	0	0	0	0	0	0	0	0	0	0	0	0	-1	1	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	-0.0063	0	0	0	-0.0027	0.0383	-0.0002	0	0
0	0	0	0	0	0	0	0	0	0	0	0	-0.0063	0	0	0	-0.0027	0.0383	-0.0002	0
0	0	0	0	0	0	0	0	0	0	0	0	0	-0.0063	0	0	0	-0.0027	0.0383	-0.0002
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-1	1

b_u (note that b_u must be rearranged into a 20×1 vector prior to solving for *u*. Also note that b_u includes the under-relaxation factor as per the last term on the RHS of Eq. 6.36)

0.001	1.79E-05	1.79E-05	1.79E-05	0
0.001	1.42E-05	1.42E-05	1.42E-05	0
0.001	1.42E-05	1.42E-05	1.42E-05	0
0.001	1.92E-05	1.92E-05	1.92E-05	0

u^*, after mass flow correction ($\dot{m}_{in} = 4\times10^{-5}$, $\dot{m}_{out} = 3.2099\times10^{-5}$).

0.001	0.0007082	0.0006841	0.0006819	0.0008498
0.001	0.0009233	0.0009082	0.000906	0.001129
0.001	0.0009342	0.0009208	0.0009187	0.0011448
0.001	0.0007266	0.0007052	0.0007033	0.0008764

A_v (under-relaxation applied as in A_u; see Eq. 6.37)

1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	-1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	-0.0063	0	0	0	0	-0.0027	0.02738	-0.0002	0	0	0	0	-0.005	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	-0.0063	0	0	0	0	-0.0022	0.02728	-0.0002	0	0	0	0	-0.005	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	-0.0063	0	0	0	0	-0.0022	0.02727	-0.0002	0	0	0	0	-0.005	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	-0.0063	0	0	0	0	-0.0022	0.02825	-0.0002	0	0	0	0	-0.005	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	-1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	-0.0063	0	0	0	0	-0.0027	0.02794	-0.0002	0	0	0	0	-0.005	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	-0.0063	0	0	0	0	-0.0025	0.02787	-0.0002	0	0	0	0	-0.005	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	-0.0063	0	0	0	0	-0.0025	0.02786	-0.0002	0	0	0	0	-0.005	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	-0.0063	0	0	0	0	-0.0025	0.02898	-0.0002	0	0	0	0	-0.005	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	-0.0063	0	0	0	0	-0.0027	0.02745	-0.0002	0	0	0	0	-0.005	0	0	0	-0.005	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	-0.0063	0	0	0	0	-0.0023	0.02736	-0.0002	0	0	0	0	-0.005	0	0	0	-0.005	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-0.0063	0	0	0	0	-0.0022	0.02735	-0.0002	0	0	0	0	-0.005	0	0	0	-0.005
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-0.0063	0	0	0	0	-0.0022	0.02835	-0.0002	0	0	0	0	-0.005	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-1	1	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-1	1

b_v (under-relaxation applied as in b_u; see Eq. 6.37)

0	0	0	0	0	0
0	1.37E-06	1.36E-06	1.36E-06	1.41E-06	0
0	1.40E-06	1.39E-06	1.39E-06	1.45E-06	0
0	1.37E-06	1.37E-06	1.37E-06	1.42E-06	0
0	0	0	0	0	0

v^*

0	0	0	0	0	0
0	6.46E-05	7.19E-05	7.25E-05	7.15E-05	7.15E-05
0	7.73E-05	8.74E-05	8.85E-05	8.66E-05	8.66E-05
0	6.81E-05	7.62E-05	7.70E-05	7.57E-05	7.57E-05
0	0	0	0	0	0

$A_{p'}$ (under-relaxation applied in this step via the d terms, i.e., $d_{i,J} = A_{i,J}\alpha_u/a_{i,J}$, as shown at the bottom of p. 189)

5.96283	-0.1746	0	-5.707	0	0	0	0	0	0	0	0
-0.1746	6.15476	-0.1746	0	-5.7275	0	0	0	0	0	0	0
0	-0.1746	6.15708	0	0	-5.7298	0	0	0	0	0	0
-5.707	0	0	11.5226	-0.2208	0	-5.5916	0	0	0	0	0
0	-5.7275	0	-0.2208	11.775	-0.2208	0	-5.6059	0	0	0	0
0	0	-5.7298	0	-0.2208	11.7796	0	0	-5.6081	0	0	0
0	0	0	-5.5916	0	0	11.5073	-0.2208	0	-5.6917	0	0
0	0	0	0	-5.6059	0	-0.2208	11.7574	-0.2208	0	-5.7099	0
0	0	0	0	0	-5.6081	0	-0.2208	11.7617	0	0	-5.7119
0	0	0	0	0	0	-5.6917	0	0	5.93618	-0.1632	0
0	0	0	0	0	0	0	-5.7099	0	-0.1632	6.11437	-0.1632
0	0	0	0	0	0	0	0	-5.7119	0	-0.1632	6.11644

b$_{p'}$

-7.84E-05	-0.000837921	-0.000901208
3.38E-05	-0.000156806	-0.000194101
0.000278606	0.000173685	0.000149205
0.001535294	0.001006104	0.000967065

p' (obtained using *A$_{p'}$* and *b$_{p'}$*, no additional relaxation)

0.00354	0.00203	0.00081	0
0.00365	0.0022	0.00096	0
0.00381	0.00239	0.00115	0
0.00399	0.00254	0.0013	0

u$_{New}$

0.001	0.00081	0.00077	0.00074	0.00085
0.001	0.00105	0.00102	0.00099	0.00113
0.001	0.00106	0.00103	0.00102	0.00114
0.001	0.00082	0.00079	0.00079	0.00088

v$_{New}$

0	0	0	0	0	0
0	1.43E-05	-3.98E-06	1.19E-06	7.15E-05	0
0	3.16E-06	2.82E-06	6.43E-06	8.66E-05	0
0	-9.83E-06	8.79E-06	8.50E-06	7.57E-05	0
0	0	0	0	0	0

p$_{New}$

0.00454	0.00303	0.00181	0.001
0.00465	0.0032	0.00196	0.001
0.00481	0.00339	0.00215	0.001
0.00499	0.00354	0.0023	0.001