H2/AIR – EQUILIBRIUM CALCULATION

	NASA CEA (T0=1000)	Cantera (T0=1000)	rTPEF(sensibleInternalEnergy) (T0=1000)	rTPEF(sensible Enthalpy) (T0=1000)	reactingFoam(t0= 1000)
T_adiabatic, K	2696	2698	2713	2664.83	2701
Mass fraction, Y					
H	0.00044	0.00044681	0.000698853	0.000518764	0.000446938
HO2	0.00001	7.232E-06	8.02355e-06	6.83308e-06	8.07068e-06
H2	0.00294	0.0029477	0.00363949	0.00314695	0.00296369
H2O	0.21680	0.21728	0.206738	0.214341	0.216976
N2	0.74135	0.74135	0.741353	0.741349	0.741351
O	0.00273	0.002882	0.00448041	0.00328707	0.00287195
OH	0.01708	0.015863	0.0198564	0.0168569	0.0161806
O2	0.01860	0.019224	0.0232256	0.0204924	0.0192017
Rho, kg/m^3			0.158798	0.172991	0.10713
U, m/sec			1.2155	1.09603	2.39179
K.E., $(0.5 \cdot U^2)$					
H(abs enth), $\frac{kJ}{kg} - K$					

H2/AIR – CONSERVATIONS OF MASS AND ENERGY

	Cantera (T0=1000)	rTPEF(sensibleInternalEnergy) (T0=1000)	rTPEF(sensible Enthalpy) (T0=1000)	rF(sensibleEnthalpy)
T_adiabatic, K	2696	2713	2664.83	2701

Steady State

	Inlet				Outlet			
	Rho	U	Ha	$KE = 0.5U^2$	Rho	U	Ha	$KE = 0.5U^2$
rF(senEnthalpy)	0.254839	1	1.0252e+06	0.5	0.107135	2.382	1.02474e+06	2.83695
rTPEF(senEnthalpy)	0.0710424	1			0.0649161	1.0960		

	$\Delta(\rho * U)$	$\Delta(KE)$	$\Delta(\mathbf{Ha})$	
rF	0.00035657 +0.139 %	2.33695 +467 %	-460 -0.044 %	
rTPEF	0.0001056456 +0.149 %			

CH4/AIR – EQUILIBRIUM CALCULATION

	NASA CEA (T0=1200)	Cantera (T0=1200)	rTPEF(sensibleInternalEnergy) (T0=1200)	rTPEF(sensibleEnthalpy) (T0=1200)	reactingFoam (t0 = 1200)
T adiabatic. K	2620	2622	2555	2609	2624
Mass fraction, Y					
CO	0.03394	0.034017	0.0302061	0.0349128	0.0340233
CO2	0.09809	0.097967	0.102744	0.0967133	0.0980735
H	0.00018	0.00018377	0.000146807	0.000204122	0.00018388
H2	0.00101	0.0010167	0.000893773	0.0010562	0.00101551
H2O	0.10829	0.10859	0.109679	0.107928	0.108649
NO	0.00796	0.0080866	0.00674392	0.00611987	0.00749971
N2	0.72085	0.72079	0.723671	0.721662	0.721023
O	0. 0.00188	0.0019192	0.00153482	0.00215496	0.00193058
OH	0.00950	0.0087578	0.0075674	0.00917756	0.00879605
O2	0.01829	0.018657	0.0173306	0.0200636	0.0187964
Rho, kg/m^3			0.124267	0.124267	0.10713
U, m/sec			1.2155	1.09603	2.39179
K.E., $(0.5 \cdot U^2)$					
H(abs enth), $\frac{kJ}{kg} - K$					

CH4/AIR – CONSERVATIONS OF MASS AND ENERGY

	Cantera (T0=1200)	rTPEF(sensibleInternalEnergy) (T0=1200)	rTPEF(sensible Enthalpy) (T0=1200)	rF(sensibleEnthalpy)
T_adiabatic, K	2622	2555	2609	2624

Steady State

	Inlet				Outlet			
	Rho	U	Ha	$KE = 0.5U^2$	Rho	U	Ha	$KE = 0.5U^2$
rF(senEnthalpy)	0.280634	1.5	861918	1.125	0.124267	3.3994	861915	5.77788
rTPEF(senEnthalpy)	0.271664	1.5			0.0933095	4.3154		

	$\Delta(\rho * U)$	$\Delta(KE)$	$\Delta(\mathbf{Ha})$	
rF	0.00148224 0.352 %	4.65288 413 %	-3 0.0003 %	
rTPEF	-0.004828 -1.1847 %			