**Hw-3 Final Report by Amol Vaze (Net-Id :- asv130130@utdallas.edu)**

**Question 1 : For each query, turn in the indexed form of the query, and the top 10 documents for the query under both weighting schemes.**

**Solution:-**

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*Output\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

Original query is as follows:-

**Query1** : .

what similarity laws must be obeyed when constructing aeroelastic models

of heated high speed aircraft .

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Query Words After Processing/(Stemmed Queries): heat similar high law obei aircraft must model construct aeroelast speed

Top 10 Documents Returned By W1 can be given as follows:-

Rank : Score : DocID Headline

1 : 1.4538005220866363 : 486 : similarity laws for aerothermoelastic testing .

2 : 1.387659277316637 : 51 : theory of aircraft structural models subjected to aerodynamic heating and external loads .

3 : 1.2200352000643173 : 573 : viscous hypersonic similitude .

4 : 1.2048226347926303 : 12 : some structural and aerelastic considerations of high speed flight .

5 : 1.1877234614488021 : 329 : various aerodynamic characteristics in hypersonic rarefied gas flow .

6 : 1.1062987745156192 : 184 : scale models for thermo-aeroelastic research .

7 : 1.044492204948742 : 14 : piston theory - a new aerodynamic tool for the aeroelastician .

8 : 0.9890384542185096 : 665 : on the theory of hypersonic gas flow with a power law shock wave .

9 : 0.9167431448726493 : 576 : viscous and inviscid stagnation flow in a dissociated hypervelocity free stream .

10 : 0.8709444431621084 : 78 : an analytical treatment of aircraft propeller precession instability .

Top 10 Documents Returned By W2 can nbe given as follows:-

Rank : Score : DocID Headline

1 : 3.3940057630314056 : 486 : similarity laws for aerothermoelastic testing .

2 : 3.082915925511947 : 51 : theory of aircraft structural models subjected to aerodynamic heating and external loads .

3 : 2.68424607572287 : 329 : various aerodynamic characteristics in hypersonic rarefied gas flow .

4 : 2.641588850162102 : 576 : viscous and inviscid stagnation flow in a dissociated hypervelocity free stream .

5 : 2.5552891693713495 : 12 : some structural and aerelastic considerations of high speed flight .

6 : 2.473071596774162 : 573 : viscous hypersonic similitude .

7 : 2.312894095380233 : 14 : piston theory - a new aerodynamic tool for the aeroelastician .

8 : 2.275205198265483 : 1268 : stable combustion of a high-velocity gas in a heated boundary layer .

9 : 2.2559383948475915 : 1263 : turbulent heat transfer through a highly cooled, partially dissociated boundary layer .

10 : 2.0881604474185123 : 184 : scale models for thermo-aeroelastic research .

Original query is as follows:-

**Query2** : .

what are the structural and aeroelastic problems associated with flight

of high speed aircraft .

. I

Query Words After Processing/(Stemmed Queries): ar flight high structur problem associ aircraft aeroelast speed

Top 10 Documents Returned By W1 can be given as follows:-

Rank : Score : DocID Headline

1 : 1.809055632609558 : 12 : some structural and aerelastic considerations of high speed flight .

2 : 1.2116490772100403 : 14 : piston theory - a new aerodynamic tool for the aeroelastician .

3 : 1.1207205411726529 : 746 : aeroelastic problems in connection with high speed flight .

4 : 1.0249069514505775 : 51 : theory of aircraft structural models subjected to aerodynamic heating and external loads .

5 : 0.9814650045470166 : 172 : some aerodynamic considerations of nozzle afterbody combination .

6 : 0.9629931483884774 : 792 : some low speed problems of high speed aircraft .

7 : 0.9404143964094742 : 100 : vibration isolation of aircraft power plants .

8 : 0.9337467841920579 : 1169 : hangling qualities experience with several vtol research aircraft .

9 : 0.916056448133064 : 1380 : the problem of obtaining high lift-drag ratios at supersonic speeds .

10 : 0.8891786711285705 : 1089 : aerodynamic characteristics of propeller-driven vtol aircraft .

Top 10 Documents Returned By W2 can nbe given as follows:-

Rank : Score : DocID Headline

1 : 4.037077808528436 : 12 : some structural and aerelastic considerations of high speed flight .

2 : 3.169002647991522 : 14 : piston theory - a new aerodynamic tool for the aeroelastician .

3 : 3.1368617782919124 : 172 : some aerodynamic considerations of nozzle afterbody combination .

4 : 3.1103834669971935 : 1380 : the problem of obtaining high lift-drag ratios at supersonic speeds .

5 : 2.875807574609746 : 746 : aeroelastic problems in connection with high speed flight .

6 : 2.7860037978924677 : 1089 : aerodynamic characteristics of propeller-driven vtol aircraft .

7 : 2.699272805812509 : 792 : some low speed problems of high speed aircraft .

8 : 2.694090658646649 : 1263 : turbulent heat transfer through a highly cooled, partially dissociated boundary layer .

9 : 2.69376767233743 : 486 : similarity laws for aerothermoelastic testing .

10 : 2.6036122321022743 : 364 : a method for analysing the insulating properties of the laminar compressible boundary layer .

Original query is as follows:-

**Query3** : .

what problems of heat conduction in composite slabs have been solved so

far .

. I

Query Words After Processing/(Stemmed Queries): heat problem solv far composit so conduc slab

Top 10 Documents Returned By W1 can be given as follows:-

Rank : Score : DocID Headline

1 : 1.6688955130371725 : 485 : linear heat flow in a composite slab .

2 : 1.421873380933386 : 144 : heat flow in composite slabs .

3 : 1.3129267962831799 : 5 : one-dimensional transient heat conduction into a double-layer slab subjected to a linear heat input for a small time internal .

4 : 1.2221214176351562 : 399 : conduction of heat in composite slabs .

5 : 1.2080443678710338 : 181 : some problems on heat conduction in stratiform bodies .

6 : 1.2018232919834664 : 91 : periodic temperature distribution in a two-layer composite slab .

7 : 1.1547999444570274 : 90 : periodic temperature distributions in a two-layer composite slab .

8 : 1.0150365147965725 : 579 : further developments of new methods in heat flow analysis .

9 : 0.9484707983815015 : 542 : biot's variational principle in heat conduction .

10 : 0.9340605750226668 : 1072 : ignition and combustion in a laminar mixing zone .

Top 10 Documents Returned By W2 can nbe given as follows:-

Rank : Score : DocID Headline

1 : 2.36466656978412 : 485 : linear heat flow in a composite slab .

2 : 2.3154695097076208 : 5 : one-dimensional transient heat conduction into a double-layer slab subjected to a linear heat input for a small time internal .

3 : 2.262209660765951 : 144 : heat flow in composite slabs .

4 : 2.242226154496407 : 1072 : ignition and combustion in a laminar mixing zone .

5 : 2.1919032093827813 : 399 : conduction of heat in composite slabs .

6 : 2.1406216637945095 : 181 : some problems on heat conduction in stratiform bodies .

7 : 2.0074693282850706 : 579 : further developments of new methods in heat flow analysis .

8 : 2.000158039389864 : 542 : biot's variational principle in heat conduction .

9 : 1.9252477150821308 : 980 : a method of computing the transient temperature of thick walls from arbitrary variation of adiabatic-wall temperature and heat-transfer coefficient .

10 : 1.904403704865245 : 584 : conduction of heat in a solid with a power law of heat transfer at its surface .

Original query is as follows:-

**Query4** : .

can a criterion be developed to show empirically the validity of flow

solutions for chemically reacting gas mixtures based on the simplifying

assumption of instantaneous local chemical equilibrium .

. I

Query Words After Processing/(Stemmed Queries): criterion assump show react develop simplifi local valid can instantan empir solution mixtur ga to equilibrium flow chemic base

Top 10 Documents Returned By W1 can be given as follows:-

Rank : Score : DocID Headline

1 : 1.8418731796431616 : 166 : flow of chemically reacting gas mixtures .

2 : 1.7551686036001213 : 1061 : turbulent mixing of a rocket exhaust jet with a supersonic stream including chemical reactions .

3 : 1.7172373984713893 : 488 : a reaction-rate parameter for gasdynamics of a chemically reacting gas mixture .

4 : 1.4014679818605134 : 1255 : the flow about a charged body moving in the lower atmosphere .

5 : 1.3740067236062647 : 185 : some possibilities of using gas mixtures other than in aerodynamic research .

6 : 1.3353415970159637 : 575 : atomic recombination in a hypersonic wind tunnel nozzle .

7 : 1.2972123753434341 : 1189 : nonequilibrium flow past a wedge .

8 : 1.2965333422925174 : 1315 : performance estimates for the rae 6in . high-pressure shock tube .

9 : 1.2758687912537001 : 167 : linearized flow of a dissociating gas .

10 : 1.2090594825747731 : 1275 : flow about an unsteadily rotating disc .

Top 10 Documents Returned By W2 can nbe given as follows:-

Rank : Score : DocID Headline

1 : 4.534477505351068 : 1255 : the flow about a charged body moving in the lower atmosphere .

2 : 4.172143988360013 : 1061 : turbulent mixing of a rocket exhaust jet with a supersonic stream including chemical reactions .

3 : 4.047467121820196 : 435 : application of similar solutions to calculations of laminar heat transfer on bodies with yaw and large pressure gradients in high speed flow .

4 : 4.040728604332239 : 24 : theory of stagnation point heat transfer in dissociated air .

5 : 3.9660295820698224 : 166 : flow of chemically reacting gas mixtures .

6 : 3.819184831501792 : 329 : various aerodynamic characteristics in hypersonic rarefied gas flow .

7 : 3.758425299460919 : 167 : linearized flow of a dissociating gas .

8 : 3.7396116525089083 : 1315 : performance estimates for the rae 6in . high-pressure shock tube .

9 : 3.651128545844925 : 575 : atomic recombination in a hypersonic wind tunnel nozzle .

10 : 3.5400694365262675 : 488 : a reaction-rate parameter for gasdynamics of a chemically reacting gas mixture .

Original query is as follows:-

**Query5** : .

what chemical kinetic system is applicable to hypersonic aerodynamic

problems .

. I

Query Words After Processing/(Stemmed Queries): applic system problem hyperson kinet aerodynam to chemic

Top 10 Documents Returned By W1 can be given as follows:-

Rank : Score : DocID Headline

1 : 1.1253061689546315 : 103 : theory of mixing and chemical reaction in the opposed jet diffusion flame .

2 : 1.0987876048334329 : 401 : inviscid hypersonic airflows with coupled non-equilibrium processes .

3 : 0.9973905486346495 : 625 : viscous and inviscid nonequilibrium gas flows .

4 : 0.9532390569797329 : 552 : chemical kinetics of high temperature air .

5 : 0.8798526872327278 : 1296 : non-equilibrium expansions of air with coupled chemical reactions .

6 : 0.8665568630436663 : 163 : an analysis of the corridor and guidance requirements for supercircular entry planetary atmospheres .

7 : 0.8526518765960153 : 1032 : on the conservativeness of various distributed force systems .

8 : 0.8276499728054276 : 943 : compressible free shear layer with finite initial thickness .

9 : 0.7427353355340044 : 968 : rocket propulsion systems for interplanetary flight .

10 : 0.7349661556617857 : 328 : the boundary layer near the stagnation point in hypersonic flow past a sphere .

Top 10 Documents Returned By W2 can nbe given as follows:-

Rank : Score : DocID Headline

1 : 2.765453070954807 : 401 : inviscid hypersonic airflows with coupled non-equilibrium processes .

2 : 2.69085549219679 : 625 : viscous and inviscid nonequilibrium gas flows .

3 : 2.635095005747067 : 163 : an analysis of the corridor and guidance requirements for supercircular entry planetary atmospheres .

4 : 2.3551497929388456 : 552 : chemical kinetics of high temperature air .

5 : 2.2213869007874893 : 981 : solutions to the heat-conduction equation with time dependent boundary conditions .

6 : 2.2151030394586235 : 342 : effect of diffusion fields on the laminar boundary layer .

7 : 2.1842872320532307 : 344 : some experimental techniques in mass transfer cooling .

8 : 2.1602021571232126 : 1147 : heat transfer to bodies traveling at high speed in the upper atmosphere .

9 : 2.060055098580906 : 103 : theory of mixing and chemical reaction in the opposed jet diffusion flame .

10 : 2.0067268193663494 : 1032 : on the conservativeness of various distributed force systems .

Original query is as follows:-

**Query6** : .

what theoretical and experimental guides do we have as to turbulent

couette flow behaviour .

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Query Words After Processing/(Stemmed Queries): turbul experiment guid behaviour do to theoret we couett flow

Top 10 Documents Returned By W1 can be given as follows:-

Rank : Score : DocID Headline

1 : 1.1025655546084954 : 798 : interaction between shock waves and boundary layers, with a note on the effects of the interaction of the performance of supersonic intakes .

2 : 0.9266218129119508 : 491 : on the close relationship between turbulent plane-couette and pressure flows .

3 : 0.8662963841690466 : 315 : scale effects at high subsonic and transonic speeds and methods for fixing transition in model experiments .

4 : 0.7367355845294266 : 257 : on turbulen flow between parallel plates .

5 : 0.6748608060770345 : 121 : a theory for base pressures in transonic and supersonic flow .

6 : 0.6475287723234522 : 344 : some experimental techniques in mass transfer cooling .

7 : 0.6142248565062429 : 385 : on a generalised porous-wall ?couette type? flow .

8 : 0.6116034268887857 : 767 : mathematical techniques applying to the thermal fatigue behaviour of high temperature alloys .

9 : 0.59144447621678 : 386 : a generalised porous-wall ?couette type? flow .

10 : 0.5762786902582766 : 296 : notes on waves through gases at pressures small compared with the magnetic pressure, with applications to upper atmosphere aerodynamics .

Top 10 Documents Returned By W2 can nbe given as follows:-

Rank : Score : DocID Headline

1 : 2.6739761154841393 : 121 : a theory for base pressures in transonic and supersonic flow .

2 : 2.6512223597834947 : 798 : interaction between shock waves and boundary layers, with a note on the effects of the interaction of the performance of supersonic intakes .

3 : 2.432369209196809 : 491 : on the close relationship between turbulent plane-couette and pressure flows .

4 : 2.282958685949254 : 257 : on turbulen flow between parallel plates .

5 : 2.25750836289431 : 315 : scale effects at high subsonic and transonic speeds and methods for fixing transition in model experiments .

6 : 2.231592731272326 : 287 : some theoretical low-speed loading characteristics of swept wings in roll and sideslip .

7 : 2.225739334870376 : 767 : mathematical techniques applying to the thermal fatigue behaviour of high temperature alloys .

8 : 2.2131092667856285 : 344 : some experimental techniques in mass transfer cooling .

9 : 2.2109269267932334 : 1374 : theoretical analysis of turbulent mixing of reactive gases with application to supersonic combustion of hydrogen .

10 : 2.204216150472395 : 610 : corner interference effects .

Original query is as follows:-

**Query7** : .is it possible to relate the available pressure distributions for an

ogive forebody at zero angle of attack to the lower surface pressures of

an equivalent ogive forebody at angle of attack .

. I

Query Words After Processing/(Stemmed Queries): avail pressur lower distribu equival zero ogiv at attack possibl relat to surfac forebodi angl

Top 10 Documents Returned By W1 can be given as follows:-

Rank : Score : DocID Headline

1 : 2.308651457562565 : 492 : prediction of ogive-forebody pressures at angles of attack .

2 : 1.6128673010348746 : 122 : a simplified approximate method for the calculation of the pressure around conical bodies of arbitrary shape in supersonic and hypersonic flow .

3 : 1.4366035555809136 : 124 : a summary of the supersonic pressure drag of bodies of revolution .

4 : 1.408953290755183 : 57 : applicability of the hypersonic similarity rule to pressure distributions which include the effects of rotation for bodies of revolution at zero angle of attack .

5 : 1.367287717451534 : 434 : contributions of the wing panels to the forces and moments of supersonic wing-body combinations at combined angles .

6 : 1.3307671648894397 : 56 : an analysis of the applicability of the hypersonic similarity law to the study of the flow about bodies of revolution at zero angle of attack .

7 : 1.3213525092824039 : 1040 : on transverse vibrations of thin, shallow elastic shells .

8 : 1.2962380307707184 : 373 : the generalized expansion method and its application to bodies travelling at high supersonic airspeeds .

9 : 1.2054839810727875 : 973 : interaction effects produced by jet exhausting laterally near base of ogive-cylinder model in supersonic main stream .

10 : 1.1953538312265604 : 232 : accuracy of approximate methods for predicting pressure on pointed non-lifting bodies of revolution in supersonic flow .

Top 10 Documents Returned By W2 can nbe given as follows:-

Rank : Score : DocID Headline

1 : 5.159360067142155 : 492 : prediction of ogive-forebody pressures at angles of attack .

2 : 4.635986692404682 : 122 : a simplified approximate method for the calculation of the pressure around conical bodies of arbitrary shape in supersonic and hypersonic flow .

3 : 4.181464471348189 : 57 : applicability of the hypersonic similarity rule to pressure distributions which include the effects of rotation for bodies of revolution at zero angle of attack .

4 : 4.065937140409991 : 232 : accuracy of approximate methods for predicting pressure on pointed non-lifting bodies of revolution in supersonic flow .

5 : 4.029365696959428 : 373 : the generalized expansion method and its application to bodies travelling at high supersonic airspeeds .

6 : 3.958752397693145 : 1104 : aerodynamic heating of blunt nose shapes at mach numbers up to 14 .

7 : 3.897299370592521 : 695 : some experiments relating to the problem of simulation of hot jet engines in studies of jet effects on adjacent surfaces at a free-stream mach number of 1.80 .

8 : 3.734464060462316 : 56 : an analysis of the applicability of the hypersonic similarity law to the study of the flow about bodies of revolution at zero angle of attack .

9 : 3.710584504092136 : 1231 : hypersonic flow over an elliptic cone: theory and experiment .

10 : 3.7105534025078897 : 124 : a summary of the supersonic pressure drag of bodies of revolution .

Original query is as follows:-

**Query8** : .

what methods -dash exact or approximate -dash are presently available

for predicting body pressures at angle of attack.

. I

Query Words After Processing/(Stemmed Queries): avail method pressur ar at attack exact predict approxim dash present bodi angl

Top 10 Documents Returned By W1 can be given as follows:-

Rank : Score : DocID Headline

1 : 1.4204733651012336 : 122 : a simplified approximate method for the calculation of the pressure around conical bodies of arbitrary shape in supersonic and hypersonic flow .

2 : 1.169547912537993 : 433 : application of two dimensional vortex theory to the prediction of flow fields behind wings of wing-body combinations at subsonic and supersonic speeds .

3 : 1.125686745469803 : 69 : predicted shock envelopes about two types of vehicles at large angles of attack .

4 : 1.106649735760719 : 292 : rapid laminar boundary layer calculations by piece-wise application of similar solutions .

5 : 1.106606885275891 : 124 : a summary of the supersonic pressure drag of bodies of revolution .

6 : 1.1051004544374463 : 248 : the application of lighthill formula for numerical calculation of pressure distributions on bodies of revolution at supersonic speed and zero angle of attack .

7 : 1.0824194339592228 : 234 : a second order shock-expansion method applicable to bodies of revolution near zero lift .

8 : 1.0478331768935991 : 688 : tables of aerodynamic coefficients obtained from developed newtonian expressions for complete and partial conic and spheric bodies at combined angles of attack and sideslip with some comparisons with hypersonic experimental data .

9 : 1.0449639955018841 : 1231 : hypersonic flow over an elliptic cone: theory and experiment .

10 : 1.0386052309897897 : 1104 : aerodynamic heating of blunt nose shapes at mach numbers up to 14 .

Top 10 Documents Returned By W2 can nbe given as follows:-

Rank : Score : DocID Headline

1 : 4.975332842958261 : 122 : a simplified approximate method for the calculation of the pressure around conical bodies of arbitrary shape in supersonic and hypersonic flow .

2 : 4.402938485507417 : 124 : a summary of the supersonic pressure drag of bodies of revolution .

3 : 4.388490895222942 : 292 : rapid laminar boundary layer calculations by piece-wise application of similar solutions .

4 : 4.098400030426658 : 492 : prediction of ogive-forebody pressures at angles of attack .

5 : 4.054445275871367 : 248 : the application of lighthill formula for numerical calculation of pressure distributions on bodies of revolution at supersonic speed and zero angle of attack .

6 : 4.052654762262842 : 1231 : hypersonic flow over an elliptic cone: theory and experiment .

7 : 4.040015767254887 : 234 : a second order shock-expansion method applicable to bodies of revolution near zero lift .

8 : 4.018130952901523 : 232 : accuracy of approximate methods for predicting pressure on pointed non-lifting bodies of revolution in supersonic flow .

9 : 3.9625647309750045 : 433 : application of two dimensional vortex theory to the prediction of flow fields behind wings of wing-body combinations at subsonic and supersonic speeds .

10 : 3.94453243599187 : 1104 : aerodynamic heating of blunt nose shapes at mach numbers up to 14 .

Original query is as follows:-

**Query9** : .

papers on internal /slip flow/ heat transfer studies .

. I

Query Words After Processing/(Stemmed Queries): heat studi intern transfer paper slip flow

Top 10 Documents Returned By W1 can be given as follows:-

Rank : Score : DocID Headline

1 : 1.081714014679918 : 550 : laminar heat transfer in tubes under slip-flow conditions .

2 : 1.0808193687577998 : 21 : on heat transfer in slip flow .

3 : 0.9648014241107601 : 45 : an investigation of separated flows, part ii: flow in the cavity and heat transfer .

4 : 0.8311259412820828 : 571 : heat transfer to flat plate in high temperature rarefied ultra-high mach number flow .

5 : 0.8262080402234884 : 22 : on slip-flow heat transfer to a flat plate .

6 : 0.7777237074631416 : 306 : second approximation to laminar compressible boundary layer on flat plate in slip flow .

7 : 0.7692155351565947 : 1215 : the effect of slip particularly for highly cooled walls .

8 : 0.7008812499014094 : 102 : advantages and limitations of models .

9 : 0.6983094928059896 : 1204 : experimental effect of bluntness and gas rarefaction on drag coefficients and stagnation heat transfer on axisymmetric shapes in hypersonic flow .

10 : 0.6664956430380697 : 270 : on combined free and forced convection laminar magnetohydrodynamic flow and heat transfer in channels with transverse magnetic field .

Top 10 Documents Returned By W2 can nbe given as follows:-

Rank : Score : DocID Headline

1 : 2.8851371026998778 : 550 : laminar heat transfer in tubes under slip-flow conditions .

2 : 2.8355980702813004 : 45 : an investigation of separated flows, part ii: flow in the cavity and heat transfer .

3 : 2.4611247682073283 : 21 : on heat transfer in slip flow .

4 : 2.298039383203679 : 270 : on combined free and forced convection laminar magnetohydrodynamic flow and heat transfer in channels with transverse magnetic field .

5 : 2.2649747734808594 : 549 : experimental study of the velocity and temperature distribution in a high-velocity vortex-type flow .

6 : 2.203522577454009 : 572 : boundary layer displacement and leading edge bluntness effects in high temperature hypersonic flow .

7 : 2.199382908210487 : 489 : on calculation of the laminar separation point and results of certain flows .

8 : 2.1741181807053884 : 1268 : stable combustion of a high-velocity gas in a heated boundary layer .

9 : 2.1382707967726824 : 89 : an investigation of separated flows, part i: the pressure field .

10 : 1.9726580874904984 : 22 : on slip-flow heat transfer to a flat plate .

Original query is as follows:-

**Query10** : .

are real-gas transport properties for air available over a wide range of

enthalpies and densities .

. I

Query Words After Processing/(Stemmed Queries): over ar avail wide densiti properti ga real transport air enthalpi rang

Top 10 Documents Returned By W1 can be given as follows:-

Rank : Score : DocID Headline

1 : 1.6816320580539574 : 493 : real-gas laminar boundary layer skin friction and heat transfer .

2 : 1.4191220645870808 : 302 : approximations for the thermodynamic and transport properties of high temperature air .

3 : 1.276369369127776 : 1199 : theoretical investigations of a supersonic laminar boundary layer with foreign-gas injection .

4 : 1.264909379595564 : 1143 : a one-foot hypervelocity shock tunnel in which high-enthalpy real gas flows can be generated with flow times of about 180 milliseconds .

5 : 1.2540864710450808 : 949 : charts for equilibrium flow properties of air in hypervelocity nozzles .

6 : 1.15353434089446 : 110 : dynamics of a dissociating gas .

7 : 1.0410891149886046 : 541 : similitude of hypersonic flows over slender bodies in non-equilibrium dissociated gases .

8 : 1.0349390873494793 : 1264 : boundary layer transition and heat transfer in shock tubes .

9 : 1.0200214212199226 : 332 : similitude of hypersonic real-gas flows over slender bodies with blunted noses .

10 : 1.0067495211982247 : 691 : calculation procedure for thermodynamic transport, and flow properties of the combustion products of a hydrocarbon fuel mixture burned in air with results for ethylene-air and methane-air mixtures .

Top 10 Documents Returned By W2 can nbe given as follows:-

Rank : Score : DocID Headline

1 : 3.480588142522945 : 493 : real-gas laminar boundary layer skin friction and heat transfer .

2 : 3.4691866384242465 : 302 : approximations for the thermodynamic and transport properties of high temperature air .

3 : 3.1461067337493396 : 1264 : boundary layer transition and heat transfer in shock tubes .

4 : 2.819110474225668 : 332 : similitude of hypersonic real-gas flows over slender bodies with blunted noses .

5 : 2.810284954615322 : 541 : similitude of hypersonic flows over slender bodies in non-equilibrium dissociated gases .

6 : 2.8045775496088794 : 583 : influence coefficients for real gases .

7 : 2.7808559282731324 : 110 : dynamics of a dissociating gas .

8 : 2.643041664742789 : 576 : viscous and inviscid stagnation flow in a dissociated hypervelocity free stream .

9 : 2.6421632591130266 : 262 : the formation of a blast wave by a very intense explosion .

10 : 2.6006724870143936 : 1313 : on the flow in a reflected shock tunnel .

Original query is as follows:-

**Query11** : .

is it possible to find an analytical, similar solution of the strong

blast wave problem in the newtonian approximation .

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Query Words After Processing/(Stemmed Queries): similar analyt strong problem solution find newtonian possibl to approxim wave blast

Top 10 Documents Returned By W1 can be given as follows:-

Rank : Score : DocID Headline

1 : 1.8358271446822716 : 495 : on similar solutions for strong blast waves and their application to steady hypersonic flow .

2 : 1.2881704369476243 : 572 : boundary layer displacement and leading edge bluntness effects in high temperature hypersonic flow .

3 : 1.1978634083474025 : 25 : inviscid hypersonic flow over blunt-nosed slender bodies .

4 : 1.1248916703447787 : 556 : numerical comparison between exact and approximate theories of hypersonic inviscid flow past slender blunt nosed bodies .

5 : 1.068238914045945 : 72 : boundary layer behind shock or thin expansion wave moving into stationary fluid .

6 : 1.0180392319061011 : 110 : dynamics of a dissociating gas .

7 : 1.0042311894958331 : 1280 : wings with minimum drag due to lift in supersonic flow .

8 : 0.9991107296269601 : 1310 : survey of inviscid hypersonic flow theory for geometrically slender shapes .

9 : 0.9739798080604634 : 262 : the formation of a blast wave by a very intense explosion .

10 : 0.9246118616859307 : 1327 : on the propagation and structure of the blast wave .

Top 10 Documents Returned By W2 can nbe given as follows:-

Rank : Score : DocID Headline

1 : 4.040882031684234 : 495 : on similar solutions for strong blast waves and their application to steady hypersonic flow .

2 : 3.5324781963571232 : 572 : boundary layer displacement and leading edge bluntness effects in high temperature hypersonic flow .

3 : 3.1958973972503566 : 72 : boundary layer behind shock or thin expansion wave moving into stationary fluid .

4 : 3.154935315097915 : 1280 : wings with minimum drag due to lift in supersonic flow .

5 : 3.126013768904204 : 110 : dynamics of a dissociating gas .

6 : 3.1145710856981923 : 1375 : an approximate solution for the axisymmetric jet of a laminar compressible fluid .

7 : 2.8426814955534327 : 472 : waves in supersonic flow .

8 : 2.799233476469382 : 28 : a note on the explosion solution of sedov with application to the newtonian theory of unsteady hypersonic flow .

9 : 2.797150793582561 : 1186 : lift of slender delta wings according to newtonian theory .

10 : 2.7686725435879054 : 305 : hypersonic strong viscous interaction on a flat plate with surface mass transfer .

Original query is as follows:-

**Query12** : .

how can the aerodynamic performance of channel flow ground effect

machines be calculated .

. I

Query Words After Processing/(Stemmed Queries): can calcul effect perform channel aerodynam ground machin flow

Top 10 Documents Returned By W1 can be given as follows:-

Rank : Score : DocID Headline

1 : 1.634419059303068 : 624 : cruise performance of channel-flow ground effect machines .

2 : 1.1832371305827851 : 650 : some design problems of hovercraft .

3 : 1.0332248915803013 : 966 : on fully developed channel flows,. some solutions and limitations, and effects of compressibility, variable properties, and body forces .

4 : 0.9900364885731997 : 649 : the hovercraft - a new concept in maritime transport .

5 : 0.9831626465502993 : 506 : a note on havelock's shallow-water wave-resistance curves .

6 : 0.9162141602980267 : 704 : a systematic kernel function procedure for determining aerodynamic forces on oscillating or steady finite wings at subsonic speeds .

7 : 0.8578103752808051 : 792 : some low speed problems of high speed aircraft .

8 : 0.8158461149992573 : 325 : heat transfer to constant property laminar boundary layer flows with power function free stream velocity and wall temperature variation .

9 : 0.7594988291925902 : 1221 : steady flow of conducting fluids in channels under transverse magnetic fields, with consideration of hall effect .

10 : 0.7116703549135436 : 329 : various aerodynamic characteristics in hypersonic rarefied gas flow .

Top 10 Documents Returned By W2 can nbe given as follows:-

Rank : Score : DocID Headline

1 : 3.7730151084404517 : 624 : cruise performance of channel-flow ground effect machines .

2 : 2.802498541003613 : 966 : on fully developed channel flows,. some solutions and limitations, and effects of compressibility, variable properties, and body forces .

3 : 2.6178663333610115 : 792 : some low speed problems of high speed aircraft .

4 : 2.616157623941508 : 917 : a method of calculating the short period longitudinal stability derivatives of a wing in linearised unsteady compressible flow .

5 : 2.600810544563524 : 329 : various aerodynamic characteristics in hypersonic rarefied gas flow .

6 : 2.514633324405022 : 650 : some design problems of hovercraft .

7 : 2.4028516426661555 : 506 : a note on havelock's shallow-water wave-resistance curves .

8 : 2.32630836606063 : 704 : a systematic kernel function procedure for determining aerodynamic forces on oscillating or steady finite wings at subsonic speeds .

9 : 2.2728329146650434 : 325 : heat transfer to constant property laminar boundary layer flows with power function free stream velocity and wall temperature variation .

10 : 2.2442700803265443 : 749 : the aerodynamic effects of aspect ratio and sweepback on wing flutter .

Original query is as follows:-

**Query13** : .what is the basic mechanism of the transonic aileron buzz . I

Query Words After Processing/(Stemmed Queries): transon mechan aileron basic buzz

Top 10 Documents Returned By W1 can be given as follows:-

Rank : Score : DocID Headline

1 : 1.8545722603883166 : 496 : a theory of transonic aileron buzz, neglecting viscous effects .

2 : 1.008354878050939 : 903 : two dimensional transonic unsteady flow with shock waves .

3 : 0.9336456088990815 : 520 : wing-tail interference as a cause of 'magnus' effects on a finned missile .

4 : 0.6759138774070522 : 643 : an investigation of wing-aileron flutter using ground launched rocket models .

5 : 0.6104827844353998 : 440 : compilation of information on the transonic attachment of flows at the leading edge of airfoils .

6 : 0.6104025950396847 : 199 : measurement of two dimensional derivatives on a wing-aileron-tab system .

7 : 0.6017169904401116 : 38 : on the prediction of mixed subsonic/supersonic pressure distributions .

8 : 0.583493384374008 : 797 : a study of the effect of leading-edge modifications on the flow over a 50degree sweptback wing at transonic speeds .

9 : 0.5624061934193467 : 313 : on alternative forms for the basic equations of transonic flow theory .

10 : 0.5256931758796766 : 415 : the aerodynamic design of section shapes for swept wings .

Top 10 Documents Returned By W2 can nbe given as follows:-

Rank : Score : DocID Headline

1 : 1.98126887493703 : 496 : a theory of transonic aileron buzz, neglecting viscous effects .

2 : 1.6257490601959563 : 903 : two dimensional transonic unsteady flow with shock waves .

3 : 1.5485821977681542 : 520 : wing-tail interference as a cause of 'magnus' effects on a finned missile .

4 : 1.097135833856512 : 313 : on alternative forms for the basic equations of transonic flow theory .

5 : 1.0882232821423203 : 440 : compilation of information on the transonic attachment of flows at the leading edge of airfoils .

6 : 1.071279667859561 : 38 : on the prediction of mixed subsonic/supersonic pressure distributions .

7 : 1.0492248805624316 : 880 : the design and testing of supersonic flutter models .

8 : 1.01135247224167 : 415 : the aerodynamic design of section shapes for swept wings .

9 : 0.9943617024972232 : 797 : a study of the effect of leading-edge modifications on the flow over a 50degree sweptback wing at transonic speeds .

10 : 0.9064590230550634 : 927 : investigation of normal force distributions and wake vortex characteristics of bodies of revolution at supersonic speeds .

Original query is as follows:-

**Query14** : .

papers on shock-sound wave interaction .

. I

Query Words After Processing/(Stemmed Queries): paper shock sound interac wave

Top 10 Documents Returned By W1 can be given as follows:-

Rank : Score : DocID Headline

1 : 1.0096521021818181 : 64 : unsteady oblique interaction of a shock wave with plane disturbances .

2 : 0.9329721952498761 : 798 : interaction between shock waves and boundary layers, with a note on the effects of the interaction of the performance of supersonic intakes .

3 : 0.8734311960268946 : 170 : the interaction of a reflected shock wave with the boundary layer in a shock tube .

4 : 0.8433091819556473 : 132 : viscosity effects in sound waves of finite amplitude: in survey in mechanics .

5 : 0.7932202933751119 : 402 : magnetohydrodynamics shocks .

6 : 0.7817847998502717 : 572 : boundary layer displacement and leading edge bluntness effects in high temperature hypersonic flow .

7 : 0.7815412219847042 : 439 : a factor affecting transonic leading edge flow separation .

8 : 0.7673750060141116 : 291 : sweepback effects in the turbulent boundary-layer shock-wave interaction .

9 : 0.7592101644779008 : 1303 : air pressure on a cone moving at high speeds .

10 : 0.7379257511903421 : 256 : an experimental study of the glancing interaction between a shock wave and a turbulent boundary layer .

Top 10 Documents Returned By W2 can nbe given as follows:-

Rank : Score : DocID Headline

1 : 2.13403456037374 : 64 : unsteady oblique interaction of a shock wave with plane disturbances .

2 : 1.989857319030797 : 170 : the interaction of a reflected shock wave with the boundary layer in a shock tube .

3 : 1.951986404824699 : 439 : a factor affecting transonic leading edge flow separation .

4 : 1.9484304162412118 : 798 : interaction between shock waves and boundary layers, with a note on the effects of the interaction of the performance of supersonic intakes .

5 : 1.914265716263367 : 1303 : air pressure on a cone moving at high speeds .

6 : 1.87994498669497 : 1327 : on the propagation and structure of the blast wave .

7 : 1.838603897664267 : 572 : boundary layer displacement and leading edge bluntness effects in high temperature hypersonic flow .

8 : 1.83108391571113 : 1313 : on the flow in a reflected shock tunnel .

9 : 1.8061355136469228 : 329 : various aerodynamic characteristics in hypersonic rarefied gas flow .

10 : 1.5858617212499118 : 132 : viscosity effects in sound waves of finite amplitude: in survey in mechanics .

Original query is as follows:-

**Query15** : .

material properties of photoelastic materials .

. I

Query Words After Processing/(Stemmed Queries): materi photoelast properti

Top 10 Documents Returned By W1 can be given as follows:-

Rank : Score : DocID Headline

1 : 1.1171286145042556 : 462 : photo-thermoelasticity .

2 : 0.6526066217011952 : 463 : physical properties of plastics for photo-thermoelastic investigation .

3 : 0.5913162799405987 : 1025 : note on creep buckling of columns .

4 : 0.5522851245970309 : 82 : theoretical investigation of the ablation of a glass-type heat protection shield of varied material properties at the stagnation point of a re-entering irbm .

5 : 0.5347578009696805 : 1043 : on transverse vibrations of thin, shallow elastic shells .

6 : 0.5133333510416778 : 542 : biot's variational principle in heat conduction .

7 : 0.49573165728494084 : 1099 : a theoretical study of stagnation point ablation .

8 : 0.49573165728494084 : 1065 : a free-flight investigation of ablation of a blunt body to a mach number of 13 .1.

9 : 0.46234041063502607 : 1127 : the buckling of sandwich type panels .

10 : 0.46234041063502607 : 1340 : method of controlling stiffness properties of a solid-construction model wing .

Top 10 Documents Returned By W2 can nbe given as follows:-

Rank : Score : DocID Headline

1 : 1.6662234101336892 : 462 : photo-thermoelasticity .

2 : 1.0751343993316804 : 463 : physical properties of plastics for photo-thermoelastic investigation .

3 : 1.0610761294332371 : 1025 : note on creep buckling of columns .

4 : 1.04986579149371 : 1099 : a theoretical study of stagnation point ablation .

5 : 1.0292032934213537 : 542 : biot's variational principle in heat conduction .

6 : 1.029150467372379 : 1043 : on transverse vibrations of thin, shallow elastic shells .

7 : 1.026352079142503 : 82 : theoretical investigation of the ablation of a glass-type heat protection shield of varied material properties at the stagnation point of a re-entering irbm .

8 : 1.0228698464708712 : 1340 : method of controlling stiffness properties of a solid-construction model wing .

9 : 0.9968650835911885 : 1065 : a free-flight investigation of ablation of a blunt body to a mach number of 13 .1.

10 : 0.9962048415688409 : 817 : loading paths and the incremental stress law .

Original query is as follows:-

**Query16** : .

can the transverse potential flow about a body of revolution be

calculated efficiently by an electronic computer .

. I

Query Words After Processing/(Stemmed Queries): can comput potenti calcul about electron revolu bodi effici transvers flow

Top 10 Documents Returned By W1 can be given as follows:-

Rank : Score : DocID Headline

1 : 1.673785208500334 : 498 : calculation of potential flow about bodies of revolution having axes perpendicular to the free-stream direction .

2 : 1.309433399548841 : 1255 : the flow about a charged body moving in the lower atmosphere .

3 : 1.1527044001196927 : 927 : investigation of normal force distributions and wake vortex characteristics of bodies of revolution at supersonic speeds .

4 : 1.0931479699091278 : 106 : the transverse potential flow past a body of revolution .

5 : 0.9966028354215529 : 231 : practical calculation of second-order supersonic flow past non-lifting bodies of revolution .

6 : 0.99124985539259 : 976 : turbulent diffusion in the wake of a blunt nosed body at hypersonic speeds .

7 : 0.9848752550676236 : 1328 : the production of aerodynamic forces by heat addition on external surfaces of aircraft .

8 : 0.9803948364119077 : 869 : the calculation of transient temperature in turbine blades and tapered discs using biot's variational method .

9 : 0.9451206372456746 : 410 : the supersonic flow about a blunt body of revolution for gases at chemical equilibrium .

10 : 0.9300385663619806 : 248 : the application of lighthill formula for numerical calculation of pressure distributions on bodies of revolution at supersonic speed and zero angle of attack .

Top 10 Documents Returned By W2 can nbe given as follows:-

Rank : Score : DocID Headline

1 : 3.95003347996546 : 498 : calculation of potential flow about bodies of revolution having axes perpendicular to the free-stream direction .

2 : 3.357136037131581 : 1255 : the flow about a charged body moving in the lower atmosphere .

3 : 3.1827556059600477 : 927 : investigation of normal force distributions and wake vortex characteristics of bodies of revolution at supersonic speeds .

4 : 2.8620290403114823 : 231 : practical calculation of second-order supersonic flow past non-lifting bodies of revolution .

5 : 2.7788776731107028 : 266 : exact solution of the neumann problem . calculation for non- circulatory plane and axially symmetric flows about or within arbitrary boundaries .

6 : 2.7303890121987426 : 801 : experimental study of the equivalence of transonic flow about slender cone-cylinders of circular and elliptic cross section .

7 : 2.7031486535413265 : 869 : the calculation of transient temperature in turbine blades and tapered discs using biot's variational method .

8 : 2.6652141014643767 : 704 : a systematic kernel function procedure for determining aerodynamic forces on oscillating or steady finite wings at subsonic speeds .

9 : 2.647585445269661 : 1356 : secondary flow fields embedded in hypersonic shock layers .

10 : 2.616109831115615 : 225 : elliptic cones alone and with wings at supersonic speeds .

Original query is as follows:-

**Query17** : .

can the three-dimensional problem of a transverse potential flow about

a body of revolution be reduced to a two-dimensional problem .

. I

Query Words After Processing/(Stemmed Queries): potenti about reduc three two can problem revolu to bodi dimension transvers flow

Top 10 Documents Returned By W1 can be given as follows:-

Rank : Score : DocID Headline

1 : 1.3350713344520622 : 1108 : a study of second-order supersonic flow theory .

2 : 1.1236012106047024 : 916 : the flow around oscillating low aspect ratio wings at transonic speeds .

3 : 1.111110611966727 : 1301 : compressible boundary layers on bodies of revolution .

4 : 1.1064276638623982 : 94 : the transverse curvature effect in compressible axially symmetric laminar boundary layer flow .

5 : 1.0931479699091278 : 106 : the transverse potential flow past a body of revolution .

6 : 1.0837589854690002 : 801 : experimental study of the equivalence of transonic flow about slender cone-cylinders of circular and elliptic cross section .

7 : 1.0736442872704823 : 1281 : turbulent heat transfer on blunt-nosed bodies in two-dimensional and general three-dimensional hypersonic flow .

8 : 1.066486469192891 : 373 : the generalized expansion method and its application to bodies travelling at high supersonic airspeeds .

9 : 1.0260223484993036 : 927 : investigation of normal force distributions and wake vortex characteristics of bodies of revolution at supersonic speeds .

10 : 1.016562912490371 : 498 : calculation of potential flow about bodies of revolution having axes perpendicular to the free-stream direction .

Top 10 Documents Returned By W2 can nbe given as follows:-

Rank : Score : DocID Headline

1 : 4.154291173548665 : 1108 : a study of second-order supersonic flow theory .

2 : 4.024337623053593 : 801 : experimental study of the equivalence of transonic flow about slender cone-cylinders of circular and elliptic cross section .

3 : 3.9670652655297647 : 373 : the generalized expansion method and its application to bodies travelling at high supersonic airspeeds .

4 : 3.828370282122487 : 1248 : an analytic extension of the shock-expansion method .

5 : 3.685767498011564 : 1301 : compressible boundary layers on bodies of revolution .

6 : 3.654076892598808 : 916 : the flow around oscillating low aspect ratio wings at transonic speeds .

7 : 3.6403881970673244 : 1281 : turbulent heat transfer on blunt-nosed bodies in two-dimensional and general three-dimensional hypersonic flow .

8 : 3.5784584569965836 : 266 : exact solution of the neumann problem . calculation for non- circulatory plane and axially symmetric flows about or within arbitrary boundaries .

9 : 3.5723522677105737 : 94 : the transverse curvature effect in compressible axially symmetric laminar boundary layer flow .

10 : 3.535968098845374 : 927 : investigation of normal force distributions and wake vortex characteristics of bodies of revolution at supersonic speeds .

Original query is as follows:-

**Query18** : .

are experimental pressure distributions on bodies of revolution at angle

of attack available .

. I

Query Words After Processing/(Stemmed Queries): ar avail at experiment attack pressur distribu revolu bodi angl

Top 10 Documents Returned By W1 can be given as follows:-

Rank : Score : DocID Headline

1 : 1.2551567089246072 : 248 : the application of lighthill formula for numerical calculation of pressure distributions on bodies of revolution at supersonic speed and zero angle of attack .

2 : 1.204207860552052 : 197 : pressure distributions on three bodies of revolution to determine the effect of reynolds number up to and including the transonic speed range .

3 : 1.1763020845675864 : 927 : investigation of normal force distributions and wake vortex characteristics of bodies of revolution at supersonic speeds .

4 : 1.1579563889658984 : 234 : a second order shock-expansion method applicable to bodies of revolution near zero lift .

5 : 1.1154073749400408 : 498 : calculation of potential flow about bodies of revolution having axes perpendicular to the free-stream direction .

6 : 1.0963533764578186 : 56 : an analysis of the applicability of the hypersonic similarity law to the study of the flow about bodies of revolution at zero angle of attack .

7 : 1.0552642807155108 : 225 : elliptic cones alone and with wings at supersonic speeds .

8 : 1.0358708723753078 : 1352 : aerodynamic investigation of a parabolic body of revolution at mach number of 1. 92 and some effects of an annular supersonic jet exhausting from the base .

9 : 1.0045901778759572 : 801 : experimental study of the equivalence of transonic flow about slender cone-cylinders of circular and elliptic cross section .

10 : 0.9903124558386134 : 1005 : free-flight measurements of the static and dynamic

Top 10 Documents Returned By W2 can nbe given as follows:-

Rank : Score : DocID Headline

1 : 4.092763198861665 : 498 : calculation of potential flow about bodies of revolution having axes perpendicular to the free-stream direction .

2 : 4.045588096722067 : 234 : a second order shock-expansion method applicable to bodies of revolution near zero lift .

3 : 4.035515828068135 : 927 : investigation of normal force distributions and wake vortex characteristics of bodies of revolution at supersonic speeds .

4 : 3.987348446431766 : 225 : elliptic cones alone and with wings at supersonic speeds .

5 : 3.722697514863521 : 248 : the application of lighthill formula for numerical calculation of pressure distributions on bodies of revolution at supersonic speed and zero angle of attack .

6 : 3.714486899548379 : 197 : pressure distributions on three bodies of revolution to determine the effect of reynolds number up to and including the transonic speed range .

7 : 3.646060416539668 : 56 : an analysis of the applicability of the hypersonic similarity law to the study of the flow about bodies of revolution at zero angle of attack .

8 : 3.6301482583125777 : 1352 : aerodynamic investigation of a parabolic body of revolution at mach number of 1. 92 and some effects of an annular supersonic jet exhausting from the base .

9 : 3.6204217729312784 : 801 : experimental study of the equivalence of transonic flow about slender cone-cylinders of circular and elliptic cross section .

10 : 3.617182130968804 : 1231 : hypersonic flow over an elliptic cone: theory and experiment .

Original query is as follows:-

**Query19** : .

does there exist a good basic treatment of the dynamics of re-entry

combining consideration of realistic effects with relative simplicity of

results .

. I

Query Words After Processing/(Stemmed Queries): treatment entri simplic realist good exist result re effect combin rel doe consider basic dynam

Top 10 Documents Returned By W1 can be given as follows:-

Rank : Score : DocID Headline

1 : 1.4707333702160312 : 82 : theoretical investigation of the ablation of a glass-type heat protection shield of varied material properties at the stagnation point of a re-entering irbm .

2 : 1.1208403587886777 : 453 : the influence of two-dimensional stream shear on airfoil maximum lift .

3 : 1.0375411617880383 : 274 : analysis of quartz and teflon shields for a particular re-entry mission .

4 : 1.0128552588684143 : 140 : the determination of turbulent skin friction by means of pitot tubes .

5 : 1.0062816617357662 : 164 : an approximate analytical method for studying entry into planetary atospheres .

6 : 0.9950279195845715 : 1346 : modulated entry .

7 : 0.9802796309211644 : 1279 : sublimation in a hypersonic environment .

8 : 0.9285948743482512 : 353 : the effect of helium injection at an axially symmetric stagnation point .

9 : 0.8909644491732724 : 1296 : non-equilibrium expansions of air with coupled chemical reactions .

10 : 0.8722435085986074 : 1119 : plastic stability theory of thin shells .

Top 10 Documents Returned By W2 can nbe given as follows:-

Rank : Score : DocID Headline

1 : 2.9308821416789934 : 82 : theoretical investigation of the ablation of a glass-type heat protection shield of varied material properties at the stagnation point of a re-entering irbm .

2 : 2.790561670566165 : 453 : the influence of two-dimensional stream shear on airfoil maximum lift .

3 : 2.7270067741825414 : 274 : analysis of quartz and teflon shields for a particular re-entry mission .

4 : 2.7263102432514636 : 140 : the determination of turbulent skin friction by means of pitot tubes .

5 : 2.595630844739933 : 927 : investigation of normal force distributions and wake vortex characteristics of bodies of revolution at supersonic speeds .

6 : 2.4508202439354054 : 1346 : modulated entry .

7 : 2.3624776768674827 : 353 : the effect of helium injection at an axially symmetric stagnation point .

8 : 2.3032897834083235 : 1296 : non-equilibrium expansions of air with coupled chemical reactions .

9 : 2.2752003729730688 : 1075 : an experimental and theoretical investigation of second-order supersonic wing-body interference, for a non-lifting body with wings at incidence

10 : 2.2727198825806463 : 44 : tip-bluntness effects on cone pressures at m=6.85.

Original query is as follows:-

**Query20** : .

has anyone formally determined the influence of joule heating, produced

by the induced current, in magnetohydrodynamic free convection flows

under general conditions .

Query Words After Processing/(Stemmed Queries): heat anyon gener joul convec influenc magnetohydrodynam formal current condition determin induc ha produc free under flow

Top 10 Documents Returned By W1 can be given as follows:-

Rank : Score : DocID Headline

1 : 2.402773954881779 : 500 : joule heating in magnetohydrodynamic free-convection flows .

2 : 1.6032365370284039 : 268 : several magnetohydrodynamic free-convection solutions .

3 : 1.433236531403722 : 88 : magnetohydrodynamic free-convection pipe flow .

4 : 1.3349518814680992 : 270 : on combined free and forced convection laminar magnetohydrodynamic flow and heat transfer in channels with transverse magnetic field .

5 : 1.285352507102013 : 44 : tip-bluntness effects on cone pressures at m=6.85.

6 : 1.2542979674818706 : 416 : methods of boundary-layer control for postponing and alleviating buffeting and other effects of shock-induced separation .

7 : 1.206919852731514 : 87 : free-convection magnetohydrodynamic flow past a porous flat plate .

8 : 1.017441780607478 : 625 : viscous and inviscid nonequilibrium gas flows .

9 : 0.9642611423648403 : 798 : interaction between shock waves and boundary layers, with a note on the effects of the interaction of the performance of supersonic intakes .

10 : 0.9329634388134436 : 267 : steady and transient free convection of an electrically conducting fluid from a vertical plate in the presence of a magnetic field .

Top 10 Documents Returned By W2 can nbe given as follows:-

Rank : Score : DocID Headline

1 : 4.278856830986074 : 500 : joule heating in magnetohydrodynamic free-convection flows .

2 : 3.9871024292211175 : 44 : tip-bluntness effects on cone pressures at m=6.85.

3 : 3.934117888461455 : 268 : several magnetohydrodynamic free-convection solutions .

4 : 3.7863083473706856 : 88 : magnetohydrodynamic free-convection pipe flow .

5 : 3.58151662470455 : 416 : methods of boundary-layer control for postponing and alleviating buffeting and other effects of shock-induced separation .

6 : 3.4940193222532376 : 375 : steady flow in the laminar boundary layer of a gas .

7 : 3.3810503910447554 : 270 : on combined free and forced convection laminar magnetohydrodynamic flow and heat transfer in channels with transverse magnetic field .

8 : 3.1394833228601002 : 625 : viscous and inviscid nonequilibrium gas flows .

9 : 3.106687768947523 : 123 : the downstream influence of mass transfer at the nose of a slender cone .

10 : 3.0628701473202486 : 1268 : stable combustion of a high-velocity gas in a heated boundary layer .

**Question 2 : Identify which documents returned by your code are relevant and non-relevant.**

**Solution**:-

**Query1**:

what similarity laws must be obeyed when constructing aeroelastic models of heated high speed aircraft

Relevant Docs : 486,51,12,329,184

Not relevant : 573,14,1263,576,665, 1268

**Query2**:

what are the structural and aeroelastic problems associated with flight of high speed aircraft

Relevant Docs: 12, 746, 172, 792, 1380,

Not Relevant: 14, 1089, 1263, 486, 78, 141, 364, 51

**Query3**:

what problems of heat conduction in composite slabs have been solved so far

Relevant Docs: 485, 144, 5, 91, 399, 181, 485, 584

Not Relevant : 1072, 579, 542, 980

**Query4**:

can a criterion be developed to show empirically the validity of flow solutions for chemically reacting gas mixtures based on the simplifying assumption of instantaneous local chemical equilibrium

Relevant Docs: 1061, 166, 488, 185, 167

Not relevant: 575, 167, 1315, 24, 1255, 435, 329

**Query5**:

what chemical kinetic system is applicable to hypersonic aerodynamic problems

Relevant Docs : 401, 552, 968

Not Relevant : 103, 625, 163, 1296, 1032, 943, 981, 103, 342, 344, 1032

**Query6**:

what theoretical and experimental guides do we have as to turbulent couette flow behaviour

Relevant Docs: 257, 798, 491, 315, 160, 1374

Non-Relevant Docs: 121, 344, 296, 148, 1075, 287, 767, 610

**Query7**:

is it possible to relate the available pressure distributions for an ogive forebody at zero angle of attack to the lower surface pressures of an equivalent ogive forebody at angle of attack

Relevant Docs: 492, 122, 124, 56,

Non-Relevant Docs: 57, 373, 434, 973, 1040, 1104, 695, 1231

**Query8**:

what methods -dash exact or approximate -dash are presently available for predicting body pressures at angle of attack

Relevant Docs: 122, 69, 124, 492, 232,

Non-Relevant Docs: 433, 688, 292, 234, 1231, 1104, 248

**Query9**:

papers on internal /slip flow/ heat transfer studies

Relevant Docs: 550, 21, 22, 571, 270,

Non-Relevant Docs: 45, 306, 102, 1215, 1204, 549, 572, 489, 1268, 89

**Query10**:

are real-gas transport properties for air available over a wide range of enthalpies and densities

Relevant Docs: 493, 302, 949, 332

Non-Relevant Docs: 1143, 110, 1010, 1264, 1199, 541, 576, 262, 1313

**Query11**:

is it possible to find an analytical, similar solution of the strong blast wave problem in the newtonian approximation

Relevant Docs: 495, 572, 262

Non Relevant Docs: 25, 556, 110, 1310, 1280, 110, 1186, 28, 305

**Query12**:

how can the aerodynamic performance of channel flow ground effect machines be calculated

Relevant Docs: 624, 966

Non Relevant : 650, 917, 506, 792, 329, 749, 36, 325, 1221

**Query13**:

what is the basic mechanism of the transonic aileron buzz

Relevant Docs: 496, 440

Non Relevant: 903, 520, 313, 38, 880, 415, 797, 927, 199, 520, 643, 38, 880, 313

**Query14**:

papers on shock-sound wave interaction

Relevant Docs: 64, 798, 170, 132

Non Relevant: 439, 572, 329, 1313, 256, 345, 335, 291, 1364, 291

**Query15**:

material properties of photoelastic materials

Relevant docs : 462, 463

Not Relevant : 1025,82,1043,1099,1065,542,1065,1340,1027

**Query16**:

can the transverse potential flow about a body of revolution be calculated efficiently by an electronic computer

Relevant Documents: 498, 1255, 106, 927

Non Relevant Documents: 869, 976, 1328, 231, 231, 704, 1356, 225

**Query17**: can the three-dimensional problem of a transverse potential flow about a body of revolution be reduced to a two-dimensional problem

Relevant Documents: 106, 1281

Non Relevant Documents: 916, 373, 801, 336, 1281, 927, 498, 94

**Query18**:

are experimental pressure distributions on bodies of revolution at angle of attack available

Relevant Documents: 197, 927

Non Relevant Documents: 234, 373, 498, 225, 248, 1352, 56, 1231, 801

**Query19**:

does there exist a good basic treatment of the dynamics of re-entry combining consideration of realistic effects with relative simplicity of results

Relevant Documents:

Non Relevant Documents: 82, 453, 140, 274, 164, 140, 1346, 1279, 353, 1119, 927, 1296, 1075, 44

**Query20**:

has anyone formally determined the influence of joule heating, produced by the induced current, in magnetohydrodynamic free convection flows under general conditions

Relevant Documents: 500

Non Relevant Documents: 268, 270, 88, 44, 416, 87, 625, 798, 1371, 375, 1267

**Question 3 : Describe why the top-ranked non-relevant document for each query did not get a lower score.**

**Solution:-**

MAX\_TF term weighting uses Maximum Term Frequency and Okapi term weighting uses avgdoclen and docLenth. Some top-ranked documents did not get a low score even if they were not relevant. This happens because the semantics of the query is not considered in both the weighing schemes. So if there is a document that contains many word from the query,( or most words from the query) (or many repetitions of the same word from the query) it will have a higher weight and hence will be one of the top ranked documents, But there is every chance that these words are simply scattered across in the document, and as a whole they don't answer the query or pertain to the query, hence they become non -relevant.

**Weighing Scheme 1: [MAX\_TF]**

There is no way to measure if the most frequently occurring term is semantically right term with respect to given query.

If the document contains a high-occurrence term that is not relevant with respect to the document’s topic, then it gives high weighting as it uses MAX\_TF. This may result into higher weight for non-relevant document. Also there is lack of stability involved as far as stop-word list is concerned.

**Weight Scheme 2: [Okapi]**

If a term occurs in more than half of the documents then IDF formula has some undesirable impacts on weighing.

If, for a term, IDF is negative and if there are two almost-identical documents where one contains the term and other doesn’t, then latter will possibly get a larger score.

This indicates that that terms appearing in more than half of the documents will negatively contribute to weighing for that document.

**Question-4:- Briefly discuss the different effects you notice with the two weighting schemes, either on a query-by-query basis or overall, whichever is most illuminating.**

**Solution**:-

* With the help of weights like W1 and W2, there is a significant difference can be observed in the ranking of the documents.
* Depending on the queries it is observed that the weighting function W2 happens to give a better ranking of the documents.
* This happens probably because of the weighting function W1 gives more importance to the number of times a word in the query occurs in a particular document.
* Consequently, a document with few words repeated multiple times gets a higher score and better ranking.
* Weighting function W2 gives higher score to those documents which have more words from the query and also the number of times a word has repeated itself in the document. Thus the rankings given by W2 are better.
* W1 is directly proportional to the tf values, and indirectly proportional to the maxtf values.
* Examples with the detailed weight calculations :  
    
  Consider, Tf = 4 , maxTf = 8 , collectionSize = 500, df = 5,  
    
  W1 = (0.4 + 0.6 \* log (4 + 0.5) / log (8 + 1.0))  
    
                  \* (log (500 / 5)/ log (500))   =  0.60076330794  
    
  Increase the df, say df = 200,  
    
     W1 = (0.4 + 0.6 \* log (4 + 0.5) / log (8 + 1.0))  
    
                  \* (log (500 / 200)/ log (500))  = 0.11953387798
* If df is larger, then W1 value is small, that is, if a term is present in many documents, it didn’t get any weightage that its present in few documents.
* In the above , now consider df = 5 and decrease maxTF = 7.  
    
    W1 = (0.4 + 0.6 \* log (4 + 0.5) / log (7 + 1.0))  
    
                  \* (log (500 / 5 )/ log (500))  = 0.61800242236  
    
  If we decrease the maxtf, the value get decreased, This means, if a term is present in a document closer to the max frequent term, it gets more scores.
* W2:  
    
  W2 =       (tf / (tf + 1.5\*(doclen / avgdoclen))) \* log  
  (collectionsize / df)/ log (collectionsize)).
* maxTf is replaced by document length and average document length is constant.
* df has the same effect as that of W1.
* If there is a big document, then score decreases.
* If there is a small document the score is less.  
    
  Example :  
    
  Consider tf = 4 ,    doclen = 100, avgdoclen 120,  collectionsize = 400  
  and df = 20,  
    
  W2 =      (0.4 + 0.6 \* (4/ (4 + 0.5 + 1.5 \*  
    
                  (100 / 120))) \* log (400 / 20)/  
    
   log (400)) =   0.60869  
    
  say doclen = 115  
    
  W2 =      (0.4 + 0.6 \* (4/ (4 + 0.5 + 1.5 \*  
    
                  (115 / 120))) \* log (400 / 20)/  
    
   log (400))  = 0.602105
* From the above result we conclude that there is a decrease in the score.
* If a term occurs in a small document then, it has more weightage than when it occurs in a bigger document.

**Question-5:- Describe the design decisions you made in building your system.**

**Solution:-**

Design decisions for the retrieval system are as follows:-

* The implemented program has several methods to implement different functions of the retrieval system.
* SAXParser class is responsible parsing and Tokenizer class is being used for tokenization.
* Index\_Query class is being used to perform all the query processing stuff.
* Data\_Encoding class is responsible for compressing indexes.
* The program uses hash maps data structure to store the different words and their inverted lists.
* The key for the hash map is the stem of the word and the value for each key is the inverted list.
* The inverted list is itself a hash map. The key of the inverted list is the document id and the value for each document id would be the corresponding frequency of that word.
* Porter stemming algorithm is being used for the stemming purpose.
* The query is stemmed using the stemming method and the stemmed words in the query are looked up in the hash map to obtain its Inverted list.
* The resultant inverted list is used to compute weights W1 and W2 using the given formulae using calculate method.
* Program converts all the words to lower case. e.g. People & people are same here.
* Program splits words with dashes and remove the “‘s “from the possessives.
* Program removes the stop words.
* Program stems the words using stemming algorithm.

The main flow of the program can be summarized as follows:-

The Main function reads in all the file paths, Cranfield, stop list and query file.

Every file from the cranfield collection is read.

Files are then tokenized and stemmed.

Stop-words are then removed from the input data.

Terms are then added to the index built.

After above step, compressed index is created using gamma and delta encoding compression technique for TF and DocId respectively.

After that , a query is parsed from the given input file.

Just like the Cranfiled files, we tokenize and stem the respective query before doing all the weight calculations and query terms searched in index.

Weights are then calculated using the given formula.

Finally, query results showing document id along with ranks are displayed with their scores (Using both the weights w1 and w2).

**Please Note**:-

1. The system makes use of dynamic path so it has to be run using run configuration for reading Cranfield database.

2. Also, I have created a separate query.txt file for top 20 queries. The program is reading the workspace queries file path in order to produce the output.