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Simulation of Physical Parameters of Dielectric Pollution using Fuzzy Logic System in the Open Environment

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ABSTRACT

Open environment is full of pollution in the presence of the air. One can find the physical parameters of the pollution using fuzzy logic membership functions & fuzzy cardinality and relative fuzzy cardinality. The density the melting point .boiling point, thermal conductivity, specific heat capacity, latent heat of evaporation, refractive index, viscosity and many other parameters may be found and their probability of failure may be made certain. The available of the pollution is the major factor because it must vanish immediately otherwise its reactivity is highly hazardous for materials vegetables, flower, fruits and electronic devices. The human health is the major study under pollution smog, fogs, smokes, clouds, and groups of gases likes air borne contaminants. One can make the groups of environment pollution as mild, moderate, harsh and severe. The physical parameters may be fuzzy parameters of the reliability, failure rate, MTBF, MTTF,

availability, forced outage rate, natural outage rate, pollution outage rate, repair rate of pollution, down state and up state may be fuzzy parameters of the pollution and may be called physical parameters of dielectric pollution. As a matter of fact the pollution is a dielectric material and can be specified by electrical parameters like dielectric constant (e), electrical resistivity (ρ), loss tangent (1/ψ), magnetic permeability, refractive index of light, thermal conductivity (Tc), viscosity (η).

Keywords: Simulation, dielectric pollution.

INTRODUCTION

It is difficult to find nature of the pollution in the open environment mixed with the air. The air is a separate material defined by standard of civil engineers as a mixture of large number of gas contents. The pollution can be easily segregated and recognized by their fuzzy logic membership function, Large number of authors worked on pollution but in the quantitative manner, one can find here the quantitative analysis in the open environment to find their parameters and reactivity with materials, man and machines. The smoke coming from petrol have many gases and liquid particles that one can find in the first paper given in reference 1. The team of authors have presented many paper on the study of pollution in the open environment using fuzzy logic and parameters of the gases and liquid material, and found useful results. Muller and bound has developed mechanisms to find the reliability of electronic equipment under pollution but made some experiments of very vague nature to get reliability in a quantitative manner.

The nitrogen gas has a density 1.25 kg/M^3 and it is always above the air and oxygen. The air has a density 1.293 kg/M^3 and found in between N2 and O2. The oxygen has the highest density 1.429 kg/M^3 and found in the lowest level. One can be safe because oxygen gas is nearer to human being and in the biosphere.

Analysis of the down pollution: Density Indices

The pollutants whose density s more than the oxygen are called down pollution. The settle down to the earth and make soil pollution.

The R can be assumed as the fuzzy logic membership function and relative cardinality may be found 0.5786 with a failure rate smog 0.5470. Similarly λ, P, and λR can be represented by the fuzzy logic membership function and their fuzzy cardinality is obtained. For λ the cardinality are 6.567 and relative cardinality 0.597 and reliability 0.550, the probability 0.45. For the risk (λR), the fuzzy cardinality is 3.4418 and relative one 0.31289, the security may be 0.6871. The cardinality of probability of failure may be 4.6345 and relative one 0.421318 and corresponding reliability part may be 0.578568 and failure rate 0.546998. Thus one can find and study a number of

random and fuzzy parameters.

Analysis of up pollution: Density Indices

The gases pollution whose densities are lower to the oxygen and air may be called up pollution and goes to the upper layer of the atmosphere and make groups with dust particles and make guuchhas and come down on the earth surface.

	Dx	(λ)	(R)	(λR)	(P)	A
Air	1.293	.7734	.4614	.3868	.5886	.7972
O_2	1.429	.6997	.4966	.3474	.5034	.7405
SO_2	2.927	.34116	.7105	.2427	.289	.5176
N2o	1.978	.5055	.6031	.3048	.3969	.6098
H2S	1.538	.6502	.522	.3394	.478	.7048
HCL	1.64	.6097	.5434	.3313	.4566	.6768
C_2H_4	1.76	.5681	.5665	.3218	.4335	.6492
C_2N_2	2.337	.4278	.6518	.2788	.3482	.5642
Cl_2	3.214	.31113	.7326	.2279	.2674	.5021
CO_2	1.977	.5058	.6030	.305	.397	.6100
NO_2	1.34	.7462	.4741	.3537	.5259	.7758
Ar	1.784					

	Dx	(λx)	(R)	risk (λR)	Availability (A)
Air	1.293	.7734	.4614	.3568	.7972
H_2	.09	11.11	1.49	16.55	.0000406
He	.179	5.586	.0037	.0206	.0101935
CH_4	.717	1.3947	.248	.3458	.6738
NH_4	.771	1.297	.2733	.3547	.7430
Water Vapors	.800	1.25	.2865	.0358	.7788
C_2H_2	1.173	.8525	.4263	.3634	.8628
N_2	1.25	.80	.4493	.3594	.8187
CO	1.25	.80	.4493	.3594	.8187
O_2	1.429	.6997	.4966	.3474	.7405

The fuzzy cardinality may be 4.0999 and relative one 0.3727 with a failure rate 0.9869 and MTTF 1.013 months or days. This system assumes the hour for density indices.

Adhering pollution and Runwa pollution viscosity Indices:

The pollution formed by gases has higher viscosity than the air and oxygen and can adhere with the bio system to keep them alive in case of O_2 of highest viscosity. The organ gas has a viscosity more than the oxygen gas and it can be dangerous to adhere with the human being to replace the O_2 gas. The gases can live together may be grouped to study their in the pollution.

Smog Content	Viscosity	λ	R	(λR)	P	A
O_2	.0000192	.052	.9493	.0493	.507	.3875
Ar	.000021	.0476	.9535	.0453	.0465	.3858
Air	.000018325	.0545	.9468	.0517	.0532	.388
He	.0000186	.0537	.9476	.0508	.0522	.3881
NO	.0000178	.0561	.9453	.0530	.0547	.3891
N_2	.0000167	.0598	.9418	.0563	.0582	.3905
CO	.0000166	.0602	.9415	.0566	.0585	.3907
CO_2	.0000140	.0714	.9310	.06647	.069	.39510
H_2O	.0000135	.074	.9286	.0687	.0714	.3961
HCL	.0000138	.072	.9300	.0669	.07	.3953
Cl_2	.0000129	.0775	.9254	.0717	.0746	.3975
SO_2	.0000117	.0854	.9180	.0783	.082	.4006
H_2S	.0000177	.085417	.9180	.0784	.082	.4007
CH_4	.0000103	.097	.9074	.088	.0926	.4053
C_2H_4	.0000097	.1030	.9020	.0929	.098	.40779
C_2H_2	.00000935	.1069	.8985	.0960	.1015	.4093
NH_4	.00000918	.1089	.8967	.0976	.1033	.4102
C_2N_2	.00000928	.1077	.8978	.0966	.1024	.4097
H_2	.00000835	.1197	.8871	.0162	.1129	.4146
H_2O	.0000087	.115	.8914	.1025	.1086	.4127

The availability of the pollution and mixed gases may be found from above fuzzy space. It may be 40% in the cardinality after the time of start immediately.
The following pollutions live together
(Ar, O_2, Air, He, NO, N_2, CO)

These pollution belong to high viscosity of the order of 0.00002 NS/m3. They easily mix in the air, O_2 and N_2,readily available gases. Among these, CO and NO are high Hazards. Their availability is high and they do not easily drift out from the air.

The CO_2,N_2O and HCL have a tendency to live together due to their moderate viscosity. The pollution Cl_2, SO_2 and H_2S group have an average viscosity 0.000013 and live together and they remain for a long time. The pollution CH_4, C_2H_4,C_2H_4, NH_4, C_2N_2, H_2 and H_2O vapour live together due to their average viscosity 0.000009 or 0.00001, one can form the group of viscosity as follow:
(20,18,13,9,8) 10^-6 NS/N^2

Thus the failure rate might be approximated:

F(λ) = (.05, .0555, .07692, .1111, .125)
The reliability fuzzy set may be :

F(R) = (.9512, .9460, .9259, .8948, .8824)
= μ(A)X

They fuzzy capacity
|A| = □μ(A)Xdx = 4.60039
And relative cardinality = ||A|| = 1/X
□ A(x)dx = 0.92007 and failure rate
λ = 0.0833 with MTTF 12.000 S

THERMAL CONDUCTIVITY STUDY OF SMOG IN THE FUZZY SPACE

	Tcx10^-4	(λ)	μ(A)x	A (availability)
H_2	1684	.0006	.99994	.368
He	1415	.000706	.9993	.3681
CH_4	302	.00331	.9967	.3690
O_2	244	.00409	.996	.3693
N_2	243	.004115	.99589	.3693
Air	241	.00415	.99589	.3694
NO	238	.0042	.99580	.3694
CO	232	.00431	.9957	.36946
NH_4	218	.00458	.99542	.3695
C_2H_2	184	.00543	.9945	.3698
C_2H_4	164	.006097	.9939	.3701
Ar	162	.006172	.9938	.3701
H_2O	158	.00633	.99368	.3702
N_2O	151	.006622	.9934	.37032
H_2S	120	.00833	.99170	.37095
SO_2	77	.01387	.98709	.3730
Cl_2	72	.01388	.9862	.3748

Fuzzy variable	μ A(x)	(λ)	(λR)	MTTF	(A)
Down pollution	0.5786	.547	.3165	1.828	.6357
Up pollution	0.3727	.9869	.3678	1.0132	.987
Viscosity	0.92007	.0833	.0766	12.0048	.3998
Thermal Conductivity	0.9944	.00561	.00557	178.253	.3699

The methane gas the highest thermal conductivity among the pollutant group.

The helium and hydrogen do not belong to pollution group and one cannot say that these two are pollution, but these gases may be found in the smog due to water and other material .Thanks the nature that O_2 gas has the highest conductivity 244 $*10^{-4}$ W/ mk otherwiseno life would exist in the environment. The air can be contain NH4, CO_2, NO, O_2 andCH_4because their thermal conductivity are approximately the some. The hydrogen and helium may remain in group. The C2H2, C_2H_4,Ar,H_2Ovapors, N_2O and H_2S may remain in a group. The SO_2 and Cl_2 may form another group to make thermal conductivity hazards.

The fuzzy cardinality of Xi = 17 fuzzy of truth grade may be 16.90491 and relative cardinality 0.99440. This is also a fuzzy membership function and can be called the thermal conductivity index, which

can indicate a failure rate $\lambda = 0.0056155$ and MTTF 178 units of time. For this case this may be in minutes.

The various probability indices are summarized here to study them to find their fuzzy cardinality.

The cardinality is 2.8657 and relative fuzzy cardinality 0.7164 with a failure rate $\lambda = 0.33345$ and MTTF 2.998 hour. The viscosity of the gases make it to drift through air and O2 gases. Most of the gaseous pollution have lower viscosity than the air. Thermal conductivity has a slow effect and the charge in the smog can take longer time. All units may be hours for availability of the pollution.

DISCUSSION

The smog made by pollution gases is brought to the study using density, viscosity and thermal conductivity parameters a MTTF. Their failure rate λ and MTTF are found using fuzzy logic theory. The fuzzy logic grades of truth are obtained in the fuzzy set and relative cardinality is obtained.

The result may be obtained through COA and MOM methods to have a confidence level. These figures may be corrected at the experimental level in the open environment.

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