



## **Mathematically Advanced Computational Heat Transfer Analysis of Cylindrical and Spherical Induction Furnaces: Review**

<sup>1</sup>Patil Kaushal, <sup>2</sup>Makwana Arjunsinh, <sup>3</sup>Arab Mohammadazhar, <sup>4</sup>Prof. Nirajkumar Mehta

<sup>1,2,3</sup>Under Graduate Students, Vadodara Institute of Engineering, Vadodara

<sup>4</sup>Assistant Professor, Vadodara Institute of Engineering, Vadodara

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**Abstract** –In this paper a detailed literature survey is done for the mathematically advanced computer heat transfer models for the analysis of cylindrical and spherical induction furnaces. Handling of furnace unit is not a simple issue. By some research paper referred we are founded issues of cylindrical and spherical furnaces to require make mathematical model and advanced thermal analysis. We think about the analysis and mathematical solution of a various furnaces. Now a day's furnace analysis and advanced mathematical solution is only of Induction type furnace and other main furnaces. But, about of spherical and cylindrical furnaces its mathematical analysis and solution is very less available now days. We think to solve this problem by a computational heat transfer analysis by mathematically. We also work on modification and the area of efficiency, cost, material used in furnace and analysis by mathematical solution. We have done a detailed literature review here to solve this problem.

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**Key words:** Mathematical Modelling, Computational Heat Transfer, Induction Furnace Wall, Cylindrical and Spherical Furnaces

### **I. INTRODUCTION**

The furnace is an equipment to use for melting the metals for casting or heating of material for changing shape and size like rolling, forging etc. It is also used for change of the properties of the metals like heat treatment processes. Generally, furnaces are classified into two types according to generating method of heat; it is combustion type and electric type. In combustion type furnace generally used as fuel is oil and coal. Then electric type furnace called as induction furnace. These are generally used in automobile and melting scrap industries. If we want to solve problem of simple heat transfer involving simple geometries with simple boundary condition then it is solved by analytical method but, when it will complex boundary condition than we cannot solve analytically. There are several ways of the numerical formulation and mathematical modeling of heat transfer problem such as finite difference method, finite element method, boundary element method. We have done a exhaustive literature study by considering this problem.

### **II. LITERATURE REVIEW**

The authors PritibhushanSinha and Subhash Chandra and have done work on “An ideal outline of the coating of a medium recurrence enlistment softening Furnace related issue of the disintegration in MFIM Furnace, in that developing practice it might enhance the effectiveness of furnace.The creators empower the usage and strategy of the pot furnace in this investigation, the thickness of the new covering and thickness in the wake of fixing parameters. In that streamlining issue, it is detailed to get an ideal strategy; it is a non straight whole number issue. That numeral of factors is little. It is important for finding the cost and time take by thickness of lining and foundation a connection as warm conductivity of covering material. (Pritibhushan Sinha et. al., 1998)The creator K.CBala is doing plan examination of an electric enlistment furnace for softening aluminum scrap in that, electrical angle manages the furnace control prerequisite to the make it utilize, and finish up improvement of the venture from hypothetically perspectives by down to earth use to the advancement on Nigerian foundry innovation and accessibility of extra parts. In recognitionfurnace outline it is manufactured advance consider control source, less upkeep cost and work necessities. (K.C. Bala et. al., oct.2005)The authors Angela Iagar, Gabriel Nicolaepopa, Ioansora has done in this paper the contamination is made by line recurrence coreless recognitionfurnaces in control supply. so, in this they have been introduced some improvement strategies for the operation. The unbalance and sounds current retained from that system. Furthermore, around then capacitors bound for the power factor remedy and amplify consonant issues. The reason of the connected which is consonant channels in the furnace transformer is to take care of this issue. (Angela iagar et. al., Jan 2009)The Authors Zongmingliu & Guangbinduanhas done research on numerical simulation and experimental analysis of an oxygen-enriched combustion

fiberglass furnace. In this inspection paper depend on think about truly valuable for understanding the furnace, enhancing working condition, diminishing dangers and enhance plan of class furnace. By which, contrast with the investigation is show information the aggregate relative mistake is lower than 2% in clarifying the reproduction is highly precise. It is connected about set up a model to couple ignition space and glass streaming utilizing UDF program. (Zongmingliu et. al., 2010)The Authors Alex lekov & Victor Franco has done work on economics of condensing gas furnaces and water furnaces potential on residential single family homes. In the U.S. single family lodging market for most regular mix of water warming and space warming is a gas furnace with gas water radiators. This theory test found that at a national level, utilizing a gathering furnace and a consolidating water radiator would indicate monetary advantage for near 33% of family unit substitution establishments and for a substantial dominant part of new development in the event that they are introduced in the meantime. By which the financial coming about of the CGF in addition to CWH alternative differs among parts of the north due for the most part to variety in vitality costs and vitality utilize. The financial matters are most positive in the Northeast and Midwest, which represent more than 80 percent of the gas Furnace and water warmer family units in the North. (Alex lekov et. al., 2010)Mr. N. Chou & O.Fdaud has done numerical analysis of combustion furnace performance by CFD. In this work, furnace is device to soften by throwing and change its shape or properties. In that vitality is misfortune diverse territories and structures and more measure of heat supply because of waste type of fumes gasses. By this theory test paper creators close about CFD reproduction and it is not just surface temperature can be legitimate anticipated inside the metal segment likewise be mimicked. What's more, by this examination utilizing for exact applies in the furnace. (V. n. chogule et. al., 2011)Mr. Vivek r gandhewar & Satish v bansod Induction has done furnace-a review in this theory test paper depends on change of profitability. In that time non accessible of legitimate instrumentation the impact of sick practice can't pass judgment. This audit is conveyed from different diary and manuals the planning of operation is liquid metal conveyance, no time delay, preheating reuse of hot gasses etc. in these creators watched that till that time endeavor isn't worry with affect variety of parameters on others. The impact of parameters can be general considered impact on efficiency can be found. (Vivek R. Gandhewar et. al., 2011)Mr. A. Abhat & S. Agarwal has done thermal analysis of induction furnace. The high temperature vacuum refining furnace can dissolve substantial metals, distil the unpredictable metal be work in sensibly quick while holding temperature. In sow that acceptance warming issue is with complex geometry. The outcome is demonstrated is temperature of pot rise 1500 c in 2 hours of warming time at 8 kHz and 400A in that we finish up about copper direct is successful to decrease electromagnetic coupling between the loop and vessel from warmed this wonders. (A.A. Bhat et. al., 2012)Mr. S.O. Jimoh has done analysis of the characteristics of the blast furnace peripheral zone. In this paper the test investigation of the choice of condition of warmth exchanger, mass trade and diminishment to its state of built up the models to figure gas temperature by which recuperation in fringe zone of impact Furnace it can be advanced warm condition of shaft Furnace in fringe zone of Furnace. (S.O. Jimoh et. al., 2013)Mr. Camilolezcano & Andre's Amell Numerical calculation of the recirculation factor in flameless furnaces. Here, in this exploration paper philosophy is utilized to numerical ascertain the distribution factor that will give come about fit well with theatrically and tentatively aftereffect of non responsive co-stream fly. The redeveloped k e demonstrates is give distribution factor consolidate with non responsive stream in any case, here produce some merging issue. At the point when executed in flameless burning Furnace. (Camilolezcano et. al., 2013)Mr. VasinGMachhar & Ravi KPopat has done thermal fatigue analysis of induction melting furnace wall for alumina ramming mass. These sorts of furnace are by and large utilized as a part of all enterprises for softening diverse material at the same time, here some issue creates like, misfortunes warm properties because of 200-400 hrs life. Along these lines, here creation plan is a bother so here required supplant furnace divider. Along these lines, coupled field investigation is utilized for enlistment softening headstrong divider. We are discovering life traverse for alumina ramming mass 200 cycles. In this investigation paper the weakness life of the furnace divider under weariness working condition was anticipated utilizing stress life strategy for various materials. On the base of limited component count and most extreme worry in acceptance dissolving furnace unmanageable divider. (Prof. N C Mehta. et al., 2013)Prof. Gaurav kumar Thakur & KawallalKurrhas done analysis of fuel injection system in blast furnace with the help of CFD software approach. In this investigation paper for enhancing warm yield and diminish warm misfortunes of Furnace utilized some scientifically techniques and get investigation on FEA programming in this way, with the assistance of this product we get a few changes in measurement of furnace component measurement. Here, in this investigation paper less point of 7 deg is utilized for higher the edge; higher will be disintegration of divider since focal point length is all the more so edge is required more. In this way, high speed will infuse on divider. At that point disintegration will involve put this reason of short length and low edge of focal point. (Gaurav KumarThakur et. al., 2013)Prof. N.C. Mehta, Mr. Akash DRajyani & Mr. VikasRGondalia has done thermal fatigue analysis of induction melting furnace wall for silica ramming mass. In this investigation paper get warm weariness investigation of enlistment softening furnace divider for silica smashing mass and here, discovers life traverse for various material for a case silica slamming mass 200 cycle from this

outcome it can be seen limited component reproduction it will get educate to disappointment of an acceptance furnace unmanageable divider in future and discover arrangement condition in numerical estimation are extremely exact. Here, likewise utilizing anxiety life strategy by plotting S-logN bend for various material. We have additionally utilized liner to expand life traverse or utilized pre-blended ramming mass for practical fiscally and show signs of improvement working life expectancy of furnace divider. (Prof. N C Mehta et. al., 2013) Andrey VGil & Alexandra YGil has done research of integral parameters for furnace of a circulating fluidized bed. In this investigation paper utilized some numerical techniques and this outcome related notes that stream rate lessen strongly at a high close-by 2/3 of aggregate tallness this outcome recommend need for redundancy of particulate rivalry of fuel or change configuration model of furnace. (Andrey VGil et. al., 2015) Saheedlekan Gbadamosi & Adegiike Melodi has done work on effects of steel plant with three phase induction furnaces power distribution quality of existing 33KW network in Nigeria. In this investigation paper principle concentrated on add up to consonant twisting (THD) it is measured by THD obstructed in simulink with the assistance of, data of a steel plant add to misfortune on circulate organize because of symphonious. This reenactment is utilized for outline detached channel was compelling in relieving contortion not as much as resistance utmost and decline specialized misfortune. This examination is for the most part utilized for and prescribed power Distribution Company in Nigerian condition obligatory condition incorporate power channels into supply systems were steel plant establishment.

(SaheedLekangBadmos et. al., 2015) Prof. Nirajkumar C. Mehta & Prof. Visvas B Rajyaguru work on thermal fatigue analysis of induction furnace wall of zirconia. In this examination paper discover life traverse zirconia material 1000 cycle from the outcome think about and limited component reenactment of warm weariness disappointment of Furnace divider. this exhaustion life of Furnace divider under warm weakness under condition so here additionally utilized anxiety life strategy by plotting with s-logN bend for zirconia material here utilized direct to build life traverse of here, utilized premixes smashing mass for sparing, money related and use, working life expectancy of enlistment liquefying Furnace divider. (Prof. Nirajkumar Mehta et. al., 2016) Prof. Nirajkumar C. Mehta & Prof. visvas B Rajyaguru works on Numerical analysis of furnace- review. Here, incorporate warmth exchange and CFD examination strategy partake huge part being developed and research of Furnace. Creators likewise comprehend significance of a protection and warmth misfortune diminishes of Furnace. Here, get ponder temperature dissemination inside Furnace. Here, can get investigation of life expectancy and disintegration rate inside the Furnace and utilized of numerical strategy for tackling heat exchange issue and confused with use of programming. (Prof. Nirajkumar Mehta et. al., 2016) Prosanto Pal & E Nandgopal Case study on energy efficiency improvement in foundries In this examination paper to get attempt diminish cost of usage of fuel and material taking care of limit enhance with the assistance of administration and scientific hypothesis. (Prosanto Pal et. al., 2016) The authors Piotr Bulinski & Jacek Smolka has done work on coupled numerical model of a metal melting in an induction furnace: sensitivity analysis and validation of model. This paper clarify coupled numerical model of metal liquefying process in enlistment Furnace. Affectability investigation of a property of metal it wills consequences for aluminum in fluid frame it did. This paper indicated shape variety is still insignia noteworthy. Here, change of numerical portrayal is required for usage of third quadrigati, vitality condition, inferences and logical laws to look at all procedure of metal liquefying in pot. (Piotr Bulinski et. al., 2016) The authors Mirkofilipponi & Andrea preseutti have done thermal analysis of an industrial furnace. This exploration paper has regularly utilized producing industry furnace. CFD reenactment for commonplace extraction operation works in fashioning Furnace. In SDF examination utilized as a part of this undertaking along these lines, by and large divisional instrument utilized of model so this reason time diminishment for entryway opening is lessen 157 sec-40 sec thus, here, control misfortune restricting fuel utilization and dirtied discharges. Other imperative thing is measured model made is qualified huge verity of Furnace. It will rely upon geometrically and working condition. This model is utilized for every last measurement and energy of any sort of vitality. (MirkoFilipponi et. al., 2016) Mathematical modelling is done for life cycle forecasting of zirconia based furnace wall. The authors Prof. Nirajkumar C Mehta and Dr. Dipesh D Shukla have represented study on this research paper. In this research paper shown furnace wall fatigue strength and working under thermal stress. This research paper doing with mathematical formulas, mathematical equations include with material properties of furnace wall. This research paper is using C++ software for solution of mathematical model. (Nirajkumar C. Mehta et. al., 2017)

**Table 1** Authors and Publication Year with Irrefutable Outcomes of Investigation

<b>Sr. No.</b>	<b>Authors and Publication Year</b>	<b>Irrefutable Outcomes of Investigation</b>
1	P. Sinha et al (1998)	An optimum design of the lining of a medium frequency induction melting furnace is developed.
2	K. C. Bala (2005)	Design analysis of an electric induction furnace is done for melting aluminium scrap.
3	A. Iagăr et al (Jan -2009)	Analysis of electromagnetic pollution produced by line frequency coreless induction furnaces is carried out.
4	Zongming Liu et al (2010)	Numerical simulation and experimental analysis is done for an oxygen-enriched combustion fiberglass furnace.
5	Alex Lekov et al (2010)	Economics of condensing gas furnaces and water heaters potential in residential single-family homes is studied.
6	V. N. Chougule et al (2011)	Numerical analysis is done for combustion furnace by CFD.
7	V. R. Gandhewar et al (2011)	A review is done for advancements in induction furnace.
8	A. A. Bhat et al (2012)	Thermal analysis is done for induction furnace.
9	N. Mehta et al (2012)	Review is completed on investigation on different kinds of furnaces.
10	S.O. Jimoh et al (2013)	Analysis is finished for the characteristics of the blast furnace peripheral zone.
11	N. C. Mehta et al (2013)	A Review is done for applications of different numerical methods in heat transfer.
12	A. Amell et al (2013)	Numerical calculation of the recirculation factor in flameless furnaces is primed.
13	N. C. Mehta et al (2013)	Metal forming analysis is done using FEA.
14	V. Gondaliya et al (2013)	Transient heat transfer analysis is conducted out of induction furnace by using finite element analysis.
15	N. C. Mehta et al (2013)	Thermal fatigue analysis of induction melting furnace wall is refined for alumina ramming mass.
16	G. K. Thakur et al (2013)	Analysis of fuel injection system is completed in blast furnace with the help of CFD software approach.
17	N. C. Mehta et al (2013)	Thermal fatigue analysis of induction melting furnace wall is done for silica ramming mass.
18	V. R. Nakum et al (2013)	A review is done for research on induction heating.
19	Andrey V. Gil et al (2015)	Research work is done for integral parameters for furnaces of a circulating fluidized bed.
20	N. C. Mehta et al (2014)	Optimization of wall thickness is done for induction furnace by FEA.
21	N. C. Mehta et al (2015)	A review is done on numerical analysis of furnace.
22	N. C. Mehta et al (2015)	Thermal fatigue analysis of furnace wall is done of zirconia.
23	N. C. Mehta et al (2015)	Comparison of finite difference method and finite element method is done for 2 d transient heat transfer problem.
24	S. L. Gbadamosi (2015)	Effects of steel plants with three-phase induction furnaces are carried out on power distribution quality of the 33 kV network in Nigeria.
25	N. C. Mehta et al (2015)	Thermal fatigue analysis of induction furnace wall for magnesia ramming mass is carried out by stress life methodology.
26	N. C. Mehta et al (2016)	Advanced mathematical modelling of heat transfer in induction furnace wall of zirconia is done to get temperature distribution.
27	N. C. Mehta et al (2016)	Advanced heat transfer analysis of alumina based refractory wall of induction furnace is done by finite difference method.
28	P. Buliński et al (2016)	Coupled numerical model of metal melting in an induction furnace is developed for sensitivity analysis and validation of model.
29	Mirko Filipponi et al (2016)	Thermal analysis of an industrial furnace is completed.
30	N. C. Mehta et al (2017)	This paper utilizes mathematical modelling for life cycle forecasting of zirconia based furnace wall.



### III. CONCLUSION

We can conclude the mathematical modelling done for heat transfer and CFD analysis have played a major role in the evolution and research in furnaces. We can understand the elements affect to the furnace efficiency like insulation material thickness and type, heat losses, power consumption etc. We can also study temperature and stress distribution inside the furnace and refractory wall. We can encompass analysis of life cycle and erosion rate in the the furnace. We can use numerical methods for elucidation of the heat transfer problems by mathematical models. It is a complex method of research in heat transfer and CFD analysis of furnace. This literature survey can be utilized for further development in advanced mathematical models for heat transfer analysis of cylindrical and spherical induction furnaces.

### References

1. Pritibhushan Sinha (1998), An optimum design of the lining of a medium frequency induction melting furnaces, regional engineering college India, 1 IFORS Elsevier science ltd, int.trans. Oplres. vol.5, issue no.4, page no.255-259.
2. K.C. Bala(oct.2005), Design analysis of an electric induction furnace for melting aluminium scrap, federal university of technology minna, Niger state Nigeria,AU journal of technology,vol.9 (2), page no.83-88.
3. Angela Iagar(Jan 2009), analysis of electromagnetic pollution by line frequency coreless induction furnaces, department of electrical engineering and industrial informatics polytechnic university Timisoara revolution street, no.5, hunedoara, 331128, WSEAS TRANSACTIONS on SYSTEMS, vol.8, issue no.1, page no.1-11.
4. ZongMingliu(2010), numerical simulation and experiment analysis of an oxygen-enriched combustion fiberglass furnace, 2010 The Second China Energy Scientist Forum school of materials and engineering, university of Jinan, Jinan, china, page no.118-123.
5. Alex Lekov,(2010), economics of condensing gas furnaces and water Furnaces potential in residential single-familyhomes, Lawrence Berkeley national laboratory,ACEEE summer study on energy efficiency in buildings, page no.9-180-9-191.
6. V.N.Chogule(2011),Numerical analysis of combustion furnace performance by CFD,department of mechanical engineering M.E.S. collage of engineering of India, IOSR journal of mechanical and civil engineering(IOSR-JMCE),ISSN(e):2278-1684,ISSN(p)2320-334X,pp: 72-79.
7. Vivek R. Gandhewar(2011),Induction furnace –A Review, mechanical engineering department, International journal of engg. And tech. vol.3 (4), ISSN: volume 2, issue 9, ISSN 2277-8616, page 125-128.0925-4024, PP: 277-284.
8. A.A.Bhat (2012), thermal analysis of induction furnace, fast reactor tech. group, chemistry group indira centre for atomic research, Gandhi centre for atomic research, kalpakkam-603102, India.
9. Nirajkumar Mehta, (May 2012), Review on Computational Investigation on Different Kinds of Furnaces, International Conference on Emerging Technologies and Applications in Engineering, Technology and Sciences, Volume 3, pp 1 – 7.
10. S.O.Jimoh (2013), analysis of the characteristics of the blast furnaces peripheral zone, international journal of science and technology research
11. N C Mehta, Vipul B Gondaliya, Jayesh V Gundaniya, (February 2013), Applications of Different Numerical Methods in Heat Transfer - A Review, International Journal of Emerging Technology and Advanced Engineering, Volume 3, Issue 2, pp 363 – 368.
12. Camilolezcano(2013),Numerical calculation of the recirculation factor in flameless furnaces,,ISSN 0012-7353,pp 144-151.
13. N C Mehta, Viral V Shiyani, Jemish R Nasit, (May 2013), Metal Forming Analysis, International Journal of Emerging Technology and Advanced Engineering, Volume 3, Issue 5, pp 190 - 196.
14. Vipul Gondaliya, MehulPujara, Nirajkumar Mehta, (August 2013), Transient Heat Transfer Analysis of Induction Furnace by Using Finite Element Analysis, International Journal of Applied Research, Volume 3, Issue 8, pp 231 – 234.
15. N C Mehta, Vasim G Machhar, Ravi K Popat, (October 2013), Thermal Fatigue Analysis of Induction Furnace Wall for Alumina ramming mass, International Journal of Science and Engineering Applications, Volume 2, Issue 10, pp 186 – 190, DOI: 10.7753/IJSEA0210.1002.
16. Gaurav Kumar Thakur(2013),Analysis of fuel injection in blast furnaces with the help of CFD software approach, international journal of scientific and research publication,volume 3,issue 3,ISSN 2250-3153,page no-1-7.

17. N C Mehta, Akash D Raiyani, Vikas R Gondalia, (February 2013), Thermal Fatigue Analysis of Induction Melting Furnace Wall for Silica ramming mass, International Journal of Emerging Technology and Advanced Engineering, Volume 3, Issue 2, pp 357 – 362.
18. Vimal R Nakum, Kevin M Vyas, Niraj C Mehta, (April 2013), Research on Induction Heating - A Review, International Journal of Science and Engineering Applications, Volume 2, Issue 6, pp 141 – 144, DOI: 10.7753/IJSEA0206.1005.
19. Andrey VGil(2015),Research of integral parameters for furnaces of a circulating fluidized bed, EDP publication science,EPJ web of conference 82,01044,page no-01044-p.1-01044-p.5.
20. Nirajkumar C Mehta, Dipesh D Shukla, Ravi K Popat, (December 2014), Optimization of Wall Thickness for Minimum Heat Loss for Induction Furnace by FEA, Indian Foundry Journal, Volume 60, No. 12, pp 19-25.
21. Nirajkumar C Mehta, Dr.Dipesh D Shukla, Vishvash B Rajyaguru, (April 2015), Numerical Analysis of Furnace: Review, National Conference on Recent Research and Development in Core Disciplines of Engineering, Vadodara, Volume: 2, pp 1 -7.
22. Nirajkumar C Mehta, Dr.Dipesh D Shukla, Vishvash B Rajyaguru, (April 2015), Thermal Fatigue Analysis of Induction Furnace Wall for Zirconia, National Conference on Recent Research and Development in Core Disciplines of Engineering, Vadodara, Volume: 2, pp 1 – 6.
23. Nirajkumar C Mehta, Dr.Dipesh D Shukla, Pragnesh D Kandoliya, (April 2015), Comparison of Finite Difference Method and Finite Element Method for 2 D Transient Heat Transfer Problem, National Conference on Recent Research and Development in Core Disciplines of Engineering, Vadodara, Volume: 2, pp 1 – 10.
24. SaheedlekanbadMosi(2015),Effect of steel plants with three-phase induction furnaces on power distribution quality of the existing 33kv network in Nigeria, advance in science and technology research journal,volume 9,no.27,pages 1-10.
25. Nirajkumar C Mehta, Dr. Dipesh D Shukla, (June 2015), Thermal Fatigue Analysis of Induction Furnace Wall for Magnesia Ramming Mass, ASME 2015 Applied Mechanics and Materials Conference, At Seattle, Washington, United States of America, Volume: 12, pp 1 – 6.
26. Nirajkumar C Mehta, Dr.Dipesh D Shukla, Pragnesh D Kandoliya, (December 2016), Advanced Mathematical Modeling of Heat Transfer in Induction Furnace Wall of Zirconia, International Journal of Engineering Research and Technology, Volume 5, Issue 10, pp 176 – 181, DOI: 10.17577/IJERTV5IS120128
27. Nirajkumar C Mehta, Dr.Dipesh D Shukla, Pragnesh D Kandoliya, (December 2016), Advanced Heat Transfer Analysis of Alumina Based Refractory Wall of Induction Furnace, National Conference on Emerging Trends in Engineering, Volume 1, pp 1 – 6.
28. Piotr Bulinski(2016),coupled numerical model of metal melting in an induction furnace:sensitivity analysis and validation of model, Silesian university of technology, institute of thermal technology and Silesian university of technology, department of industrial informatics, ,ISSN 0033-2097
29. MirkoFilipponi (2016), thermal analysis of an industrial furnace, MDPI Energies, 2016, 9, 833, 1-30.
30. Prof.Nirajkumar C. Mehta (2017)Mathematical Modelling for Life Cycle Forecasting of Zirconia Based Furnace Wall,international Journal Of Advance Research And Innovative Ideas In Education,IJARIIIE-ISSN (O)-2395-4396, Vol-3 Issue-4 2017,pp 796-807.