

A Bibliographic Analysis of Transformer Literature 2001-2010

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Abstract-- This paper analyzes the bibliography on transformer research covering the period of 2001-2010. Due to the large number of publications in peer review journals, conferences and symposia contributions were not included. That is why 22 peer review journals were investigated, in which 933 papers including the word “transformer” in their title have been published in the decade 2001-2010. The most productive and high-impact authors and countries are identified. The four most productive countries are Japan, USA, China, and Canada. More than 75 citations were received by each one of the five most cited papers. The bibliographic research presented in this paper is important because it includes and analyzes the best research papers on transformers coming from many countries all over the world and published in top rated scientific electrical engineering journals.

Index Terms-- Bibliographic analysis, distribution transformer, impact, power transformer.

I. INTRODUCTION

THIS paper analyzes publications to all the different subjects of transformer, e.g.: a) Transformer design, b) Transformer protection, c) Transformer connections, d) Transformer diagnostics, e) Transformer failures, f) Transient analysis of transformers (overvoltages, overcurrents), g) Modeling and analysis of transformer using FEM (thermal modeling, losses modeling, insulation modeling, windings modeling). Most of electrical engineering peer review journals in English are considered. The investigated journals are listed in Table I. The analysis of publications can help assessing the productive and high-impacting authors and countries in worldwide transformer research.

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II. METHODOLOGY FOR ANALYZING TRANSFORMER BIBLIOGRAPHY

All publications on transformers were downloaded from the respective internet link of the journals and the following elements were stored in a database: journal name, year of publication, paper title, number of citations the paper has received, name of first author, affiliation of first author, and country of first author. In this research database, only research papers were considered, including original research papers, reviews, and letters. For example, discussions and closures of IEEE Transactions on Power Delivery were excluded from this research database. To assess the impact of these papers, citation information was downloaded during December 2010, from Google Scholar. The collected data for bibliographic analysis was preprocessed by crediting each paper to its first author. This means that if a paper has more than one author, then the paper is credited to its first author, i.e., the paper is credited to name of the first author, to the affiliation of the first author, and to the country of the first author. If the first author has more than one affiliation, only the first affiliation of this author was considered.

TABLE I
ELECTRICAL ENGINEERING JOURNALS CONSIDERED (LISTED IN ALPHABETICAL ORDER)

Advances in Electrical and Computer Engineering
Canadian Journal of Electrical and Computer Engineering
COMPEL-The International Journal for Computation and Mathematics in Electrical and Electronic Engineering
Electrical Engineering
Electric Power Components and Systems
Electric Power Systems Research
European Transactions on Electrical Power
IEEE Computer Applications in Power Magazine
IEEE Power & Energy Magazine
IEEE Transactions on Applied Superconductivity
IEEE Transactions on Dielectrics and Electrical Insulation
IEEE Transactions on Education
IEEE Transactions on Energy Conversion
IEEE Transactions on Industry Applications
IEEE Transactions on Magnetics
IEEE Transactions on Power Delivery
IEEE Transactions on Power Systems
IET Electric Power Applications
IET Generation, Transmission, and Distribution
IET Science, Measurement, and Technology
International Journal of Electrical Power and Energy Systems
Journal of Magnetism and Magnetic Materials

TABLE II
TEN MOST CITED PAPERS FROM 2001 TO 2010

Rank	Title	Authors	Year	Country	Cites
1	"A novel approach to the classification of the transient phenomena in power transformers using combined wavelet transform and neural network"	Mao, P.L.; Aggarwal, R.K.;	2001	United Kingdom	86
2	"Review of modern diagnostic techniques for assessing insulation condition in aged transformers"	Saha, T.K.;	2003	Australia	78
3	"A fundamental approach to transformer thermal modeling. I. Theory and equivalent circuit"	Swift, G.; Molinski, T.S.; Lehn, W.;	2001	Canada	76
4	"Elimination of transformer inrush currents by controlled switching. I. Theoretical considerations"	Brunke, J.H.; Frohlich, K.J.;	2001	USA	76
5	"A wavelet-based technique for discrimination between faults and magnetizing inrush currents in transformers"	Youssef, O.A.S.;	2003	Egypt	76
6	"Transfer function method to diagnose axial displacement and radial deformation of transformer windings"	Rahimpour, E.; Christian, J.; Feser, K.; Mohseni, H.;	2003	Germany	73
7	"A medium-voltage transformerless AC/DC power conversion system consisting of a diode rectifier and a shunt hybrid filter"	Srianthumrong, S.; Akagi, H.;	2003	Japan	70
8	"Aging of oil-impregnated paper in power transformers"	Lundgaard, L.E.; Hansen, W.; Linhjell, D.; Painter, T.J.;	2004	Norway	69
9	"A power electronic-based distribution transformer"	Ronan, E. R.; Sudhoff, S. D.; Glover, S. F.; Galloway, D. L.;	2002	USA	67
10	"Computation of very fast transient overvoltages in transformer windings"	Popov, M.; van der Sluis, L.; Paap, G.C.; De Herdt, H.;	2003	The Netherlands	67

TABLE III
MOST PRODUCTIVE AUTHORS FROM 2001 TO 2010 (TAKING INTO ACCOUNT ONLY THE FIRST AUTHOR OF THE PUBLICATION)

Rank	Name	Affiliation	Counts	Country
1	Okabe, S.	R&D Center, Tokyo Electr. Power Co., Yokohama	13	Japan
2	Diaz, G.	Department of Electrical Engineering, University of Oviedo	9	Spain
3	Yamaguchi, H.	Energy Technol. Res. Inst., Nat. Inst. of Adv. Ind. Scien. & Technol., Ibaraki	9	Japan
4	Kang, Y.C.	Department of Electrical Engineering, Chonbuk National University, Chonju	9	Korea
5	Popov, M.	Delft University of Technology, Power Systems Laboratory, CD Delft	8	The Netherlands
6	Saha, T. K.	Sch. of Inf. Technol. & Electr. Eng., Univ. of Queensland, Brisbane, Qld.	8	Australia
7	Faiz, J.	Dept. of Electr. & Comput. Eng., Univ. of Tehran	8	Iran
8	Olivares-Galvan, J. C.	Universidad Autonoma Metropolitana-Azcapotzalco	7	Mexico
9	Purkait, P.	School of ITEE, Queensland Univ., St. Lucia, Qld.	7	Australia
10	Radakovic, Z.	Faculty of Electrical Engineering, University of Belgrade, Belgrade, Serbia	7	Serbia
11	Rahimpour, E.	University of Zanjan, Zanjan	7	Iran
12	Rezaei-Zare, A.	University of Tehran	6	Iran
13	Susa, D.	Helsinki Univ. of Technol., Espoo	6	Finland
14	Tripathy, M.	Motilal Nehru National Institute of Technology Allahabad, Allahabad,	6	India
15	Fofana, I.	Université du Québec à Chicoutimi, Québec,	5	Canada
16	Garcia, B.	Univ. Carlos III de Madrid	5	Spain
17	Moravej, Z.	Protection & Control Division, Moshanir Co., Tehran	5	Iran
18	Amoiralis, E. I.	Technical University of Crete (TUC)	4	Greece
19	Georgilakis, P. S.	National Technical University of Athens (NTUA)	4	Greece
20	Gustavsen, B.	SINTEF Energy Research, Trondheim	4	Norway
21	Zhang, Jiahui	University of Waterloo, Waterloo, ON and Siemens Energy and Automation, Pittsburgh, PA	4	Canada, USA
22	Naderi, M. S.	School of Electrical Engineering, University of New South Wales	4	Australia
23	Pompili, M.	Dept. of Electr. Eng., Univ. of Roma "La Sapienza", Rome	4	Italy
24	Pradhan, M. K.	High Voltage Engineering Department, Indian Institute of Science, Bangalore	4	India
25	Saleh, S.A.	School of Ocean Technology, Marine Institute, Memorial University of Newfoundland, St. John's, NL	4	Canada
26	Satish, L.	High Voltage Engineering Department, Indian Institute of Science, Bangalore	4	India
27	Shintemirov, A.	Dept. of Electr. Eng. & Electron., Univ. of Liverpool, Liverpool	4	UK
28	Tsili, M. A.	National Technical University of Athens (NTUA)	4	Greece

TABLE IV
TEN MOST PRODUCTIVE COUNTRIES FROM 2001 TO 2010

Rank	Country	Counts
1	Japan	119
2	USA	92
3	China	87
4	Canada	56
5	Iran	52
6	India	45
7	United Kingdom	45
8	Spain	38
9	Taiwan	37
10	Germany	35

TABLE V
TEN MOST PRODUCTIVE JOURNALS FROM 2001 TO 2010

Rank	Journal	Counts	Share (%)
1	IEEE Transactions on Power Delivery	322	34.5
2	IEEE Transactions on Applied Superconductivity	111	11.9
3	IEEE Transactions on Dielectrics and Electrical Insulation	92	9.9
4	IEEE Transactions on Magnetics	88	9.4
5	Electric Power Systems Research	71	7.6
6	Electric Power Components and Systems	31	3.3
7	Electrical Engineering	31	3.3
8	IEEE Transactions on Industry Applications	31	3.3
9	European Transactions on Electrical Power	26	2.8
10	IEEE Transactions on Power Systems	25	2.7
Ten most productive journals		828	88.7
Rest 12 journals		105	11.3
TOTAL 22 JOURNALS		933	100.0

III. OUTSTANDING PAPERS, AUTHORS, AND JOURNALS FROM 2001 TO 2010

Table II lists the most cited papers from 2001 to 2010. Obviously, in these outstanding papers in terms of citations received, the names of all authors are presented in the third column of that table. It can be seen from Table II that the ten most cited papers accumulate a total of 738 citations. Moreover, these ten most cited papers are related to the transient studies in transformers. The ten most cited papers have an average of 7.38 citations per year from the date of their publication.

Tables III and IV show the most productive authors and countries, respectively, from 2001 to 2010. It can be seen from Table IV that the four most productive countries are Japan, USA, China, and Canada. According to the analysis, S. Okabe, G. Díaz, H. Yamaguchi, and Y.C. Kang, and M. Popov are the five most productive authors with a total of 48 publications (see Table III). It can be seen from Table V that 88.7% (828 out of 933) of articles have been published in ten journals (out of the 22 investigated journals of Table I). Moreover, Table V also shows that six IEEE journals (Transactions) are included in the list of the ten most productive journals; more specifically, 669 papers on transformers have been published in these six IEEE journals, i.e., 80.8% of the total 828 publications on

transformers in the ten most productive journals of the period from 2001 to 2010. Due to page limitation, only the 99 top cited papers from 2001 to 2010 are listed in the reference section [1]-[99].

IV. CONCLUSIONS

This paper assessed the state of transformer research based on the publications in the most important electrical engineering journals during the decade of 2001-2010. It is found that Japan, USA, China, and Canada researchers lead transformer research. The ten most cited papers have an average of 7.3 citations per year and the three top cited papers are from UK, Australia, and Canada, respectively. S. Okabe, G. Díaz, H. Yamaguchi, Y.C. Kang, and M. Popov are the five most productive authors. The results of this work were computed manually and maybe there are errors or omissions. As future work, the authors propose the implementation of a web search engine to investigate the information presented in this research. This information would be presented and updated automatically. Finally, the authors did not include journals such as, IEEE Electrical Insulation Magazine, which would change the information presented in this paper, for example the author I. Fofana would add four more papers, resulting in a total of nine papers as first author. This was an unintentional omission.

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