

Professor Jorge Ambrósio: A tribute on the occasion of his 65th birthday

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EXTENDED ABSTRACT

1 Introduction

It is a great pleasure and an immense honor to write this humble and personal tribute to Professor Jorge Ambrósio on the occasion of his 65th birthday. This report is very modest, since the authors cannot summarize all the work and impact of one of the most influential researchers in the field of multibody dynamics. Further, this narrative is quite personal in the measure that it reflects the authors' knowledge acquired over the last decades of close interaction and cooperation with Jorge Ambrósio. Thus, this work presents his achievements at different levels, namely in what concerns the scientific research, the industrial influence, and the educational impact. Professor Jorge Ambrósio has been an extremely active and highly productive researcher in multibody dynamics, with more than 230 publications, which generated more than 6000 citations, and 45 of his publications receiving more than 45 citations, leading to an extraordinary *h*-index of 45 according to the Scopus database [1]. This figure is absolutely extraordinary, since multibody dynamics is a relatively new discipline, where much lower author and paper citation rates are the norm compared to other scientific areas. In fact, Professor Jorge Ambrósio's publications represent a remarkable and highly influential body of knowledge in the multibody dynamics community. In short, Professor Jorge Ambrósio is without any doubt one of the most prominent researcher and academic of his generation.

2 Short biography

Professor Jorge Ambrósio was born on September 16th, 1958, in Santarém, where he also attended the secondary public school. Jorge received his bachelor's degree in mechanical engineering from Instituto Superior Técnico (IST) in 1981, after which he joined the IST as a research assistant, and where Jorge became a full professor of mechanical engineering. Jorge concluded his doctorate at The University of Arizona in 1991, under the mentorship of Professor Parviz Nikravesh with PhD thesis "Elastic-Plastic Large Deformations of Flexible Multibody Systems in Crash Analysis". More than four decades of his extensive work with a large national network, Portugal has become a world leading scientific player in the multibody dynamics community. In 1997, Professor Jorge Ambrósio, together with Professor Werner Schiehlen, founded the journal Multibody System Dynamics, which has been instrumental in establishing and consolidate the new scientific area of multibody dynamics. Jorge Ambrósio has supervised more than 20 PhD students and dozens MSc students at the IST, as well as in other Portuguese and abroad universities. It is very common to have in the scientific meetings Jorge's students presenting works with extremely innovative and interesting results.

3 Scientific publication output

The distribution of publication output has been established as an important criterion to assess the perceptions in the research activities related to a collection of publications. Thus, the type of publication, the annual publications trend, and the journals in which Professor Jorge Ambrósio has disseminated his work are discussed in the following. For this purpose, the Scopus database was utilized to identify and extract information on Jorge Ambrósio's publications.

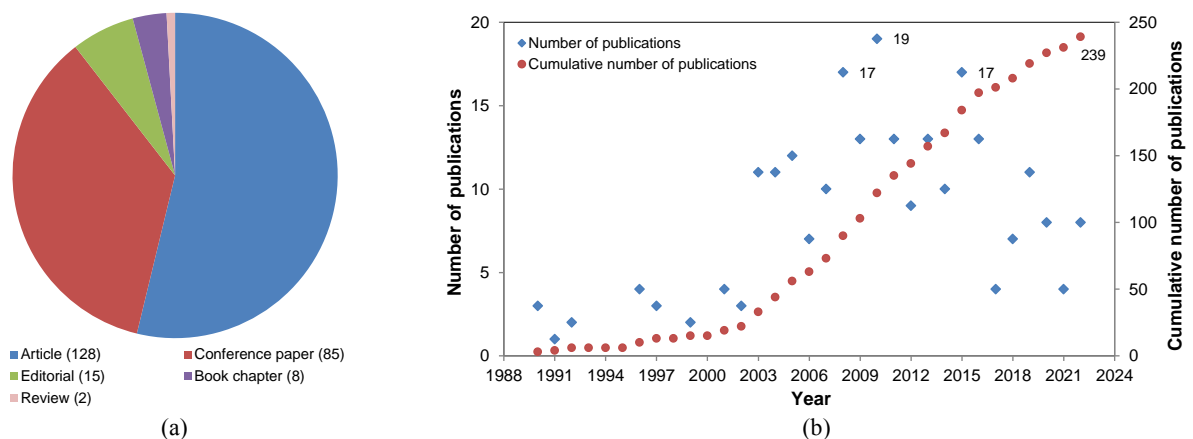


Figure 1: (a) Type of document published by Professor Jorge Ambrósio in the years 1990-2022; (b) Annual publication trends.

Figure 1a depicts the type of documents published by Professor Jorge Ambrósio in the years 1990-2022, where the proportion of each publication category is shown. It can be observed that his publications can be grouped into five categories, namely article (129), conference paper (85), editorial (15), book chapter (8), and review (2). It must be highlighted that most of the publications are original papers, representing 53.97% of the publications in the timespan 1990-2022. This category is followed by conference paper (35.56%), editorial (6.28%), book chapter (3.35%), and reviews (0.84%). The high number of research papers demonstrates Jorge Ambrósio's creativity, leadership and dynamism throughout the entire community. Moreover, the number of conference papers and editorials shows Jorge Ambrósio's compromise to share his time and knowledge in conferences and his views and thoughts in editorials.

Figure 1b shows the annual trends of Professor Jorge Ambrósio's publications in the years 1990-2022, covering 33 years. It can be observed that Jorge Ambrósio has published a total of 239 documents indexed in the Scopus database, with an average output of 7.24 articles published per year. This indicates that Jorge Ambrósio can be regarded as a highly productive researcher. From the analysis of the plots in Fig. 1b, it can be drawn that the annual number of publications is relatively volatile. Conversely, the cumulative number of publications can be considered linear in the timespans 1990-2001 and 2002-2022, with higher slope in the late case. Further, three significant peaks happen in the number of publications plot, namely 2010 with 19 publications and 2008 and 2015 with 17 publications. The highly productive phase correspond to these peaks period, that is, 2008-2015, representing 46.44% of the total documents published by Jorge Ambrósio. The total number of citations collected is equal to 6158, representing an average of 25.77 citations per document. Amongst the 239 documents published by Jorge Ambrósio, more than 40 papers have scored more than 50 citations [1].

Professor Jorge Ambrósio has been conducting his studies in several different research areas, namely in the domains associated with multibody systems formulations, vehicle dynamics, crashworthiness, biomechanics, structural dynamics and contact and impact problems. According to some investigations, world scientific production doubles every nine years [2]. For the particular case of Professor Jorge Ambrósio, his scientific productive, on average, has been doubling every 4.43 years. Professor Jorge Ambrósio's publications are distributed over several different sources, including *Multibody System Dynamics* (41), *Civil Comp Proceedings* (17), *International Journal of Crashworthiness* (14), *Vehicle System Dynamics* (12), *Mechanisms and Machine Science* (11), *Nonlinear Dynamics* (8), *Journal of Multi-Body Dynamics* (7), *Computers and Structures* (6), *International Journal for Numerical Methods in Engineering* (6), *Lecture Notes in Applied and Computational Mechanics* (6) etc. The output of distribution of the publication sources is relatively balanced. The top 10 sources account for 53.56% of his publications.

4 International collaborations

Amongst the 239 documents published by Jorge Ambrósio, a good number of them are the result of international cooperations with other institutions. He has been cooperating with researchers from 18 countries, namely Argentina, Austria, Canada, China, Czechia, Denmark, Finland, France, Germany, Italy, Japan, Poland, South Korea, Spain, Sweden, UK, and USA. According to Scopus database, Professor Jorge Ambrósio has a total of 136 co-authors. He was the first author in 48 (20.08%) of the publications, and he was the last authors in 72 (30.13%) of the publications. Furthermore, Professor Jorge Ambrósio was the only author in 17 (7.11%) of the papers he has published. In the network, João Pombo has 63 co-publications with Professor Jorge Ambrósio, followed by Paulo Flores (40), Seabra Pereira (32), Hugo Magalhães (27), Pedro Antunes (25), Pimenta Claro (23), Hamid Lankarani (22), and Miguel Silva (20). Jorge Ambrósio has been a continuous presence as a teacher and mentor in summer schools, workshops, and courses over the years. He gave a good number of invited lectures at congresses and conferences, and also organized numerous scientific meetings in Portugal and abroad. Jorge Ambrósio initiated the ECCOMAS Multibody Dynamics conferences series in 2003.

5 Final remarks

This work is an incomplete attempt to summarize Professors Jorge Ambrósio's achievements as one of the world's key players in the multibody dynamics community. It is fair to say that no matter in what circumstance or capacity someone has interacted and cooperated with Professor Jorge Ambrósio, supervisor, opponent, educator, mentor, co-author, competitor, colleague, etc., everybody is impressed and has a positive opinion about him, and cannot forget the experience of meeting Jorge. Finally, the authors would like to state that it has been a tremendous pleasure, a privilege and an honor to have a continuous and close interaction with Professor Jorge Ambrósio year after year, and most importantly he has become the best personal friend. The authors, with all their hearts, wish that for many years to come Professor Jorge Ambrósio may still find stimulation for the benefit of all the community.

Acknowledgments

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References

- [1] J.E. Hirsch. An index to quantify an individual's scientific research output. *PNAS* 102:16569-16572, 2005.
- [2] P.O. Larsen, M. von Ins. The rate of growth in scientific publication and the decline in coverage provided by Science Citation Index. *Scientometrics*, 84: 575-603, 2010.