

**Royal Academy of Engineering
International Travel Grant Ref. IJB/LB/ITG 04-928**

Report on Conference attendance

**The 7th International Conference on Bond Graph Modelling and Simulation
(ICBGM2005)
22 – 25 January 2005, New Orleans, Louisiana, USA**

**Dr R F Ngwompo
Department of Mechanical Engineering
University of Bath
Bath BA2 7AY**

The International Conference on Bond Graph Modelling and Simulation is held every two years. This conference is the major event in the field of bond graph modelling techniques attracting scientists and industrialists from all over the world to meet and inform the community of the current state of the art of bond graph methodology and applications.

Bond graphs have been one of my areas of research interest for many years and the last time I attended and presented a paper at the International Conference on Bond Graph Modelling and Simulation was in Phoenix in 1997. Attendance at this year's conference was very important for me as this gave me an opportunity to present my latest work to the international bond graph community, to assess how much the community has developed and to renew my acquaintance with some bond graphs leading experts I met a few years ago.

The conference was arranged in two parallel sessions over three days. The papers covered areas of bond graphs methodology for systems modelling, analysis and synthesis with applications to automotive, aerospace and even medical engineering domains.

I presented a paper "on the role of power lines and causal paths in bond graph-based inversion" on the first day of the conference at the session entitled "Theory". The paper addressed the problem of bond graph-based systems and control design where inverse models are required. It was shown in my presentation that the bond graph-based inversion algorithm we previously proposed could be improved by using both the concepts of power lines and causal paths. The paper was well received and generated fruitful discussions with an exceptionally wider audience, as this first session happened to be a unique session not in parallel with any other. General comments were that the new proposed algorithm was more efficient as in many cases only power lines – an acausal concept – needed to be searched for inversion instead of systematic search of causal paths.

I had the opportunity to meet many international colleagues including Prof. Dauphin-Tanguy of Ecole Centrale Lille with whom I had useful discussions following-up from the contact we had when I was a researcher at INSA Lyon in France. Interestingly, in the plenary session talk entitled "Bond graphs for modelling and much more...", our work with my colleagues from INSA Lyon was quoted by given by Prof. Dauphin-

Tanguy, as an interesting example of bond graph application to systems synthesis as opposed to numerous applications in the area of modelling and simulation. It was also interesting to attend a presentation on an on-going research work dealing with a "Probabilistic strategy based dynamic system design using bond graph and genetic algorithm (GA)". This idea of combining bond graphs and GA for systems synthesis is the topic of a PhD project currently under my supervision and in its final year. It was good to realise that our research is up-to-date with the trend in the community and to compare differences of methodologies.

I also renew contacts with Dr Balance working with Prof. Gawthrop of Glasgow University on the development of MTT (Model Transformation Toolbox): an open source bond graph project and we discuss the potential for them providing assistance in using MTT for our applications as well as us providing feedback as external users. This conference also enabled me to meet Dr Bideaux from INSA Lyon who was my co-author for the paper presented, as the idea for this paper originated when he was a visiting lecturer at Bath on a semester leave. During lunch breaks or dinners, we shared information about sessions he or I could not attend because of two sessions running in parallel.

Attendance at this conference gave me an opportunity to meet and renew my previous contacts and to establish new contacts from academia. However, not many people from industry attended the conference but it was reassuring to notice that many research works presented by academia were sponsored by industry. These numerous industrially supported projects and the fact that two sessions were dedicated to bond graphs software presentations confirmed the idea that bond graphs are increasingly becoming design tools for industry.

I would like to address my sincere thanks to the Royal Academy of Engineering for their financial support in making this trip possible through the award of an international travel grant.

Dr R F Ngwompo

28 February 2005