

Fredi Tröltzsch turns sixty



Prof. Dr. Fredi Tröltzsch was born in Dennheritz near Zwickau on November 30, 1951, and grew up in Freiberg in the Ore Mountains (Erzgebirge). Fredi showed his mathematical talent early and completed his studies in Mathematics at Bergakademie Freiberg (Freiberg Mining Academy) after only four years with his diploma in Mathematics. Afterwards, he received his Ph.D. degree in 1977 under the supervision of Lothar von Wolfersdorf, also at Bergakademie Freiberg. After a guest stay at the Technical University of Warsaw he finished his habilitation thesis titled "Necessary Optimality Conditions and Generalized Bang-Bang-Principles for Nonlinear Control Problems subject to Parabolic Differential Equations and Control and State Constraints" in 1982. From 1983 until 1988 he was Associate Professor at Technical University Karl-Marx-Stadt, where he was appointed to Full Professorship in 1988. After the reunification of Germany, Karl-Marx-Stadt returned to its original name of Chemnitz and Fredi became Full Professor at TU Chemnitz. In October 2000 he moved to Berlin and acquired his current position as Full Professor in Numerics of Partial Differential Equations and Nonlinear Optimization at TU Berlin.

Beginning with his Ph.D. thesis Fredi's research focussed on optimal control of integral and partial differential equations, and during his scientific career he was able to contribute several deep results to this very active field of

applied mathematics. His major topics of interest were the generalized bang-bang-principle, existence and regularity of Lagrange multipliers, second-order sufficient conditions, and a priori estimates for the discretization of optimal control problems. In addition, the books written by Fredi bear testimony to his remarkable scientific creativity and productivity (Tröltzsch, 1984, 2005, 2010). His textbook on optimal control of PDEs became a well accepted introduction in this field, particularly for graduate students. Due to the big success of the German version (Tröltzsch, 2005), the book was translated by Jürgen Sprekels into English (Tröltzsch, 2010).

Besides his mathematical passion, Fredi has also always been interested in concrete applications of optimization. He led and participated in various application driven research projects and several co-operation undertakings with industrial companies starting already in the former GDR, where he was investigating the optimized cooling of steel on behalf of SKET Magdeburg, an East-German heavy machinery company. Later on, this project was successfully continued in cooperation with Mannesmann-Demag-Sack GmbH. Other application problems he dealt with were glass cooling, flow control, crystal growth, induction heating, and optimal control of magnetic fields. One of his major achievements is certainly his ability to bridge the gap between applications and mathematics such that all his applied projects resulted in publications of ambitious mathematical value.

During his scientific career Fredi collaborated with a multitude of applied mathematicians and it would go beyond the scope of this Preface to list all of them. Due to his outstanding scientific achievements the mathematical community held Fredi in high esteem already before the fall of the Berlin wall. It is certainly remarkable that he was twice invited to Oberwolfach workshops before the reunification in 1989. Unfortunately, GDR officials forced him to refuse the first invitation to Oberwolfach and only allowed him to accept the second one. After the reunification, together with Irena Lasiecka, Günter Leugering, Karl Kunisch and Jürgen Sprekels, Fredi belonged to the organizers of a very successful series of Oberwolfach workshops on optimal control of PDEs. Besides his scientific merits Fredi always did a great deal for the optimal control community, which is much appreciated by his colleagues. For instance he is a long standing member of the 7th Technical Committee (TC 7) of the International Federation for Information Processing (IFIP) and organized the IFIP TC 7 conference in 2011 in Berlin together with Dietmar Hömberg. Currently, he is the associate editor of two leading journals in optimal control, namely *SIAM Journal on Control and Optimization* and *Computational Optimization and Applications*.

Finally, we would like to underline Fredi's merits concerning the education of applied mathematicians in optimal control theory. During his academic career he supervised a multitude of diploma and Ph.D. theses, among them the theses of Karsten Eppler, Arnd Rösch, Daniel Wachsmuth, and Christian Meyer who were in the meantime appointed professors in optimal control themselves. All

of his students will certainly agree that Fredi's supervision is exemplary. He is always amenable and generates a friendly and enormously inspiring atmosphere in his research group. In the name of all his students, we would like to take the chance to thank him for his great supervision.

We dedicate this special issue to the sixtieth birthday of Fredi Tröltzsch. The large number of colleagues from Fredi's scientific neighbourhood who contributed to this special issue is a remarkable indication for his reputation in the optimal control community. In this way the special issue became an impressive collection of recent results in optimal control of PDEs and well reflect the area of Fredi's field of research. We are deeply grateful to all colleagues who contributed to this special issue.

We wish our friend and colleague, Fredi Tröltzsch, all the best for his future and would like to congratulate him on the occasion of his sixtieth birthday:

Lieber Fredi, herzlichen Glückwunsch zum Geburtstag!

ROLAND HERZOG, guest editor
CHRISTIAN MEYER, guest editor
ARND RÖSCH, guest editor
JAN SOKOLOWSKI, guest editor

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