A virtual reactor for simulation of plasma enhanced chemical vapor deposition

Krzhizhanovskaya, V.V.

Publication date
2008

Citation for published version (APA):
Krzhizhanovskaya, V. V. (2008). A virtual reactor for simulation of plasma enhanced chemical vapor deposition.

General rights
It is not permitted to download or to forward/distribute the text or part of it without the consent of the author(s) and/or copyright holder(s), other than for strictly personal, individual use, unless the work is under an open content license (like Creative Commons).

Disclaimer/Complaints regulations
If you believe that digital publication of certain material infringes any of your rights or (privacy) interests, please let the Library know, stating your reasons. In case of a legitimate complaint, the Library will make the material inaccessible and/or remove it from the website. Please Ask the Library: https://uba.uva.nl/en/contact, or a letter to: Library of the University of Amsterdam, Secretariat, Singel 425, 1012 WP Amsterdam, The Netherlands. You will be contacted as soon as possible.
Chapter 9. Acknowledgements

First and foremost, I want to express my deepest gratitude to Peter Sijtsema—a great supervisor and a very deserving man—for giving me the opportunity to extend my horizons, for introducing me to the scientific life at large, and for sharing his amazing enthusiasm. I also thank Yuriy Gorbachev—my Russian supervisor—for sharing his deep understanding of physics, for his patience and kind character. It has been (and hopefully will be) a pleasure to work with the two of them—not only the highly esteemed professors, but most importantly very bright personalities!

Next, I would like to express my gratitude to the Promotion Committee: Sergey Alexandrov, Marian Bubak, Wim Goedheer, Alfons Hoekstra, Jean-Pierre Taran, and Robert Meijer, for fruitful discussions and helpful comments on this manuscript. I had the honour to collaborate with you in various projects, and I am happy that you will see some of the results of this joint work included in this thesis.

Special thanks go to Jean-Pierre Taran for his inspiration, energy and remarkable trust in people. I sincerely appreciate his help with the manuscript. It started from the words "It's OK if your work is not perfect. If it were then you would be a Nobel Prize nominee and not a PhD candidate". At that time I believed that only a thousand times better work deserved a PhD degree... and I still do! © Jean-Pierre, I also thank you and your family for the incredible hospitality!

I would like to thank Wim Goedheer with his group from FOM Institute for Plasma Physics and Yatin Rath with his lab from Utrecht University for long and fruitful collaboration. Your plasma model and experimental results were the corner-stones of my work.

I should specially mention Alfons Hoekstra—a brilliant organizer and scientist—who has been helping me in organizing the workshop on Simulation of Multiphysics Multiscale Systems during the last two years. I also thank Bastien Chopard and Yuriy Gorbachev who helped me with that for three years before Alfons.

Vladimir Korkhov deserves a big thank for his work on Grid implementation and performance testing. Together we developed the adaptive load balancing algorithm for parallel applications on the Grid; and Volodya was doing all the hard work on actual coding. A considerable part of Chapter 5 we wrote and published together. Later we introduced a hybrid resource management technique combining application-level automated load balancing with the system-level scheduler. This work (not included in the thesis) was done in close collaboration with Jacob Moscicki from CERN.

I am grateful to Mikhail Zatevakhin, Olga Maslennikova and Alexey Ignatiev for their work on the computer environment REAF from which the Virtual Reactor was later born; to Vitaly Schweigert and Irina Schweigert for their help with the first plasma simulations; to Dmitry Malashonok, Sergey Romanov, Maxim Kluev, Irina Shoshmina and Alfredo Tirado-Ramos for supporting the Grid testbed and assisting in our work on Grid implementation. Hans Ragas and Michael Scarpa are gladly acknowledged for their help with the 3D virtual reality visualization. The help of the emerging middleware for Grid
computing developed by the CrossGrid consortium has proven to be crucial for the success of Grid implementation.

I am lucky to work in the Section Computation Science with the very nice people and strong experts. I would like to thank Dick van Albada for his amazing attention to detail, for his help in the workshop organization, and for sharing his office during some of my visits. I did not work together with all the group members, but I always find communication with all of you very inspiring: Rob Bellemans, Brian van der Oudenaarde, Jaap Kaandorp, Simon Portegies Zwart, Elena Zudilova-Seinstra, Drona Kandhai, Bas van Vlijmen, Kasia Ryczek, Alfredo Tirado-Ramos, Alessia Gualandris, Michael Scarpa, Lilit Axner, Maxim Yurkin, Syed Murtaza, Lev Naumov, Dmitry Vasyunin, Ilkay Altintas, Derek Groen. I should also acknowledge Mike Lankamp for his superb technical support of the conference web server. I apologize if I missed some names; that must be only because I do not see you all too often.

I am indebted to Erik Hittebeek for his enormous help with all kind of official matters and arrangements. If this thesis exists in print, it is thanks to Erik who was my proxy at the publisher. The complete list of things that Erik helped me with would be too long, so I leave this paragraph unfinished, but solely devoted to you – an indispensable irreplaceable incredible secretary, the key person in maintaining order and nice spirit of the group.

My work at the former Institute for High Performance Computing and Data Bases of St. Petersburg State Polytechnic University gave me an valuable research and life experience. I would like to thank the people I worked with: Mikhail Zatevakhin, Alexey Ignatiev, Olga Maslennikova, Elena Stankova, Maria Pavlova, Evgeniy Sokolov, Alexander Samsonov, Maria Samsonova, Alexander Boukhanovsky, Alexey Porubov, Ashot Gevorkyan, Armen Grigoryan, Denis Moskvin, Alexander Bogdanov, and many others.

I shall thank all my teachers, from my primary school to the university, for sharing their knowledge and inspiration. I'd like to specially mention my teachers: Viktor Rodionov in physics, Igor Sohan in math, and Vladimir Volvovik in chemistry (St. Petersburg Phys-Math Lyceum 239). I am very grateful to Mikhail Streletz and Mikhail Shur for giving me the first research experience at the State Institute for Applied Chemistry, where I worked towards my Master thesis. Mikhail Streletz then gave me one advice that brought me here: to study English. I am happy and grateful I did follow it, and I consequently thank also my English teachers: Gillian Zakharova from Liverpool and Albina Semenovna from my primary school.

Here is a line to my dear friends from the happy high-school times: Anna Rabkina, Yuriy Kats, Denis Alekseev, Viktor Muraviov, and Andrey Ignatov. We do not meet often lately, but I carry you in my heart and always remember what Anna (a Doctor of Medicine practicing in the States) once said: "You must get a PhD. I want to have a PhD friend!" An'ka, you were the only one who ever phrased it like this, so I did it partly for you. 😊

I thank my parents and grand parents for raising me with the idea that intellectual strength is one of the most important virtues, right after the honor. I thank my late father for solving cross-words and puzzles with me, as early as I started to talk (or maybe earlier, I do not recall well). I thank my mom for her easy loving personality, for her sweet care and for being proud of me. My fascination with math and computers started in the kindergarten
(when computers did not actually exist): my grandmother was occasionally taking me to her work in a bank, and I happily struck complicated balances with astronomical numbers. At the age of 5 or 6 I was declared to have sufficient qualification to work in the bank, so I decided that calculating things could be my future job –along with the job of a detective, traveler and ballerina. (You must be laughing at this point, but my mom was an amateur ballet dancer, so I sometimes walked that special way, hoping that someone might suspect I am a ballerina. Now I hope nobody did! ☺). A programmable calculator I got as a present a few years later made me forget about the ballet and detectives: simulating the motion of stars and sledges and forests and Bob knows what was so exciting that whatever I did in the future was inclined to computer simulations. (Now I am amazed that it was possible without a 4 GHz processor and a 500 Gb hard drive!)

My last and my biggest thanks go to my family: my husband Alexander, always so patient and kind, and to my lovely daughter Sveta (translated from Russian as "light"), who grew up so smart and mature that I started taking lessons from her. I cannot thank you enough for your support and comfort, and just for being with me. Together with my mom, you are the light of my life!