Foreword

Selected papers from the 27th International Conference on Transport Theory (ICTT27)

Guest Editors

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Every odd year from 1969 through 2019—and then in 2022 on account of the COVID-19 pandemic—a select group of mathematicians, physicists, engineers, and computational scientists calling themselves transport theorists gathered for one week at what was originally called the Blacksburg Conference (now known as the International Conference on Transport Theory [ICTT]). Originated by Paul F. Zweifel (deceased), Bob Erdman, and Chuck Siewert, the conference was intended to bring together theorists the world over to discuss common methods to solve the neutron transport equation with application to nuclear energy. The original meeting's format gave each of the 25 participants attending, representing the United States, Yugoslavia, and Turkey, an hour and a piece of chalk to present their work—though some did use an overhead projector, the PowerPoint of its day. The second conference, funded by the U.S. Department of Energy, took place at Los Alamos Scientific Laboratory and included additional topics—in particular, Monte Carlo and radiative transfer.

After the second conference, the meeting series seemed to take on a life of its own. In subsequent years, the topics were expanded to include plasma physics, radiative transfer, kinetic theory, graphical rendering, satellite remote sensing, astrophysics, protein folding, semiconductors, traffic flow, and more. Notably, the second author of this foreword hosted the 1979 conference in Tucson, Arizona, during the Three Mile Island accident, featuring a detailed accident analysis by noted reactor dynamicist D. L. Hetrick. By ICTT21 in Torino in 2009, hosted by Piero Ravetto, there were nearly 100 presentations representing 17 countries, making the conference truly international.

The conference venue moved around the world, from Blacksburg, Virginia, to Montecatini Terme, Italy, in 1985 (the first conference outside the United States)—to, not in any particular order, Lubbock, Texas; La Jolla, California; Atlanta, Georgia; Goteborg, Sweden; and London, England. Other host cities included Riccione, Italy; Albuquerque, New Mexico; Beijing, China; Rio de Janeiro, Brazil; Budapest, Hungry; Monterey, California; Santa Fe, New Mexico; Obninsk, Russia; Portland, Oregon; and Paris, France, with several Blackburgs interspersed early on. It is a tribute to our unofficial society that our conference has prevailed for 54 years—through good and bad economic times and even a pandemic, we have been able to continue ICTT, even though we are not a society with a regular membership. We are simply a collection of like-minded individuals dedicated to solving and applying, each in their own way, one of the most fundamental and storied equations of mathematical physics and engineering.

Special thanks go to all past conference organizers, who, through their dedication, have enabled our tradition to continue and flourish:

Paul Zweifel
Bill Hendry
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Domiziano Mostacci
Nick Gentile
Farzad Rahnema
Anil Prinja
Andrea Zoia
Barry Ganapol
Paul Nelson
Todd Palmer
Imre Pázsit
Vincio Boffi
Tullio Trombetti

Vincenzo Molinari
Gianni Frosali
Cassiano De Oliviera
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The authors had the pleasure of organizing and hosting the 27th edition of the Blacksburg Conference recently at the University of Bologna Convention Center, located in the castle on a hill Mount Cesubeo in Bertinoro, in the Italian province of Forlì-Cesena, Emilia-Romagna near Via Emilia. The conference was originally scheduled for 2021, in keeping with odd-year tradition; however, the pandemic rendered this impossible, and ICTT27 instead took place July 10–16, 2022. In the beautifully situated tenth-century castle, about 75 participants from all over the world presented and attended seven sessions during five days concerning such topics as radionuclide production, equations of state of a Fermi gas, the advection-diffusion equation, the Fokker–Planck equation, neutron multiplicity and branching, transport in a moving mesh, pressurized water reactor control rod motion, waves in gas bubbles, the Vlasov–Poisson–Landau kinetic equation, plasma transport, Monte Carlo, stochastic COVID-19 modeling, the BGK equation, charged particle transport, and more specialized topics in particle transport theory. The selected sixteen papers in this special issue of *Nuclear Science and Engineering* represent some of the topics presented.

We would like to thank the organizing committee members Davide Giusti, Monica Michelacci of the Bertinoro residence, and Maria Groppi for their planning and arrangements for a well-organized and informative meeting.

We close with a remembrance our transport colleagues who have moved on, leaving us a rich legacy of knowledge upon which we continue to build:

Chandrasekhar (Chandra)
Carlo Cercignani
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Aldo Belleni-Moranti
Rolf Petterson
T. A. Gemogenova
Ray Aronson
Noel Corngold

Hope to see you at our next gathering in 2024, to be hosted in Rome by Ryan McClarren at the Notre Dame Rome Global Gateway Convention Center of Notre Dame University.

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