AccelOrator

AccelSoft™

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New PBO Lab MARYLIE Module

Lie algebra code is now available for PBO Lab 2.0

AccelSoft is pleased to announce that MARYLIE, an optics code developed at the University of Maryland, is now available as an add-on Application Module for PBO Lab 2.0. The new MARYLIE Module is one of four FORTRAN optics codes that "plug into" the PBO Lab interface.

MARYLIE is a program for beam transport and tracking based on a Lie algebraic formulation of charged particle trajectory calculations. MARYLIE is useful for the design and evaluation of both linear transport systems and circulating storage rings. The program is able to compute transfer maps and trace rays through single or multiple beamline elements for the full six-dimensional phase space without the use of numerical integration or traditional matrix methods.

The effects of high-order aberrations are computed as an integral part of the Lie algebra approach. All nonlinearities through third-order, including chromatic effects, are included.

Other add-on Application Modules currently available for PBO Lab on the Windows platform are TRANSPORT, TURTLE, and TRACE 3-D (see below). Please visit our web site at www.ghga.com/accelsoft or email us at accelsoft@ghga.com for more information on MARYLIE or any of the other modules that are integrated into the PBO Lab graphic user environment.

PBO LAB TRACE 3-D FOR WINDOWS

We are happy to announce that the **beta release** of the TRACE 3-D Application Module is now available for PBO Lab 2.0 on the Windows platform. TRACE 3-D is one of four Application Modules that are integrated into the PBO Lab interface.

TRACE 3-D is a FORTRAN program that calculates envelopes, centroids, and phase-space ellipses of a bunched beam, including linear space charge forces, as it propogates through a beamline. This accelerator beam dynamics code also supports fourteen types of fitting or beam-matching options.

While TRACE 3-D has been available for several years now for the Macintosh with the PowerTrace application, Windows users can now take advantage of the extensive tools and features available in the PBO Lab 2.0 interface when using the TRACE 3-D Module. Existing PBO Lab users who have purchased the application within the last twelve months or who have renewed their Tech Support and Product Update Service with AccelSoft can purchase the TRACE 3-D Module separately. Please contact us at accelsoft@ghga.com for more information on this new product.

Upcoming Conferences

Below is a list of upcoming conferences where AccelSoft plans to be a featured industrial exhibitor. We invite our readers to meet members of the AccelSoft staff and to take advantage of the opportunity to ask questions, offer suggestions, and learn more about our software.

- **April Meeting of the American Physical Society**
  Long Beach, California *29 April – 2 May 2000*
- **7th European Particle Accelerator Conference (EPAC2000)**
  Vienna, Austria *26 – 30 June 2000*
- **20th International Linear Accelerator Conference (LINAC2000)**
  Monterey, California *21 – 25 August 2000*
- **16th International Conference on the Application of Accelerators in Research and Industry (CAARI2000)**
  Denton, Texas *1 – 4 November 2000*

AccelSoft Inc. ▲ 10855 Sorrento Valley Road Suite 202A ▲ San Diego, California 92121
Phone: 858.677.0133 ▲ Fax: 858.784.3736 ▲ E-mail: accelsoft@ghga.com ▲ www.ghga.com/accelsoft

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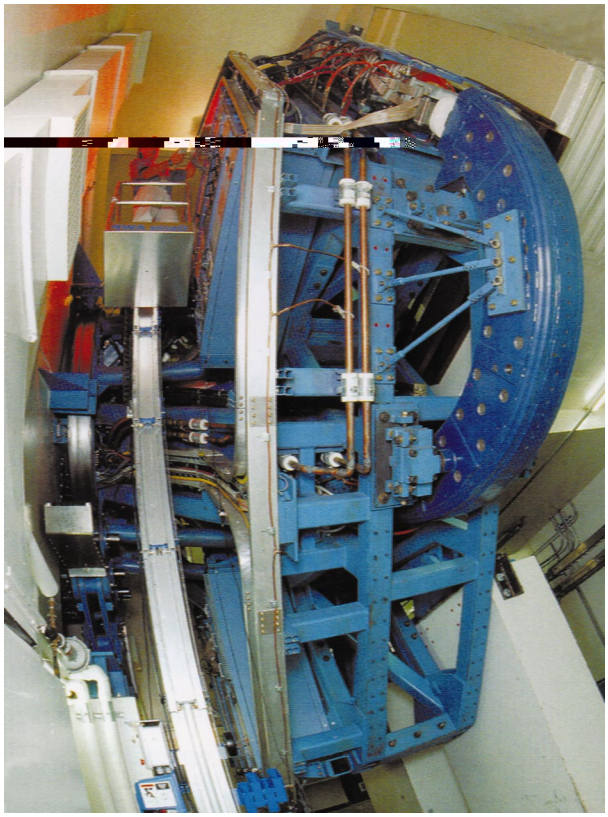
AccelSoft User Profile

PBO Lab's role at Loma Linda's Proton Therapy Center

Over the past year, we have become quite familiar with Dr. George Coutrakon: since he purchased PBO Lab last spring, he has relied on the software not only for his work at Loma Linda's Proton Therapy Center, but also in his experience as an instructor at the U.S. Particle Accelerator School. He has been instrumental in introducing PBO Lab to the medical accelerator community. We are grateful to Dr. Coutrakon for sharing his thoughts on both his work and his use of PBO Lab with our readers.

Dr. Coutrakon is the Director of Accelerator Operations at Loma Linda University Medical Center's Proton Treatment Center. He heads a team of six physicists who monitor the day-to-day operation of the accelerator. "My role is not only to ensure proper training, but also to do development work with the accelerator and the beam transport system at night and on weekends," he explains.



One of the gantries at Loma Linda's Proton Therapy Center.

"The features of a user-friendly environment and the ability to look at graphical displays of the TRANSPORT output quickly are certainly some of the most useful aspects for us."

His work is a vital aspect of the Proton Therapy Center, which has treated about 5,000 patients since its opening in 1990. The Center's accelerator, built at Fermilab, is the world's smallest variable-energy proton synchrotron. Its function is to deliver a beam of sufficient particle energy to reach the deepest tumors in patients. Because the characteristic energy distribution of protons can be deposited in tissue volumes in a three-dimensional pattern designated by the physician, proton therapy provides greater control and precision during the treatment process.

His group's primary focus is to transport 90 percent (or higher) of the extracted beam to the treatment room in order to give the highest dose rate (or beam intensity) possible for each patient. Dr. Coutrakon uses PBO Lab to model the beam parameters from the accelerator to the treatment rooms. "The features of a user-friendly environment and the ability to look at graphical displays of the TRANSPORT output quickly are certainly some of the most useful aspects for us," he continues. "The environment makes it very easy for people to get started in using [PBO Lab] quickly."

When he taught the Hadron Accelerators for Cancer Treatment course in January at the U.S. Particle Accelerator School, Dr. Coutrakon decided to incorporate PBO Lab as an educational tool into the lab portion of his class. He used examples from medical physics applications to illustrate how to transport a beam from an accelerator to a variety of treatment rooms. "One of the students' lab exercises was to create the optics solutions using quadrupoles from a Loma Linda-type accelerator that would get the beam transported into either a rotatable gantry room or into a horizontal fixed beam room," he elaborates. "I think [this approach] was very successful."

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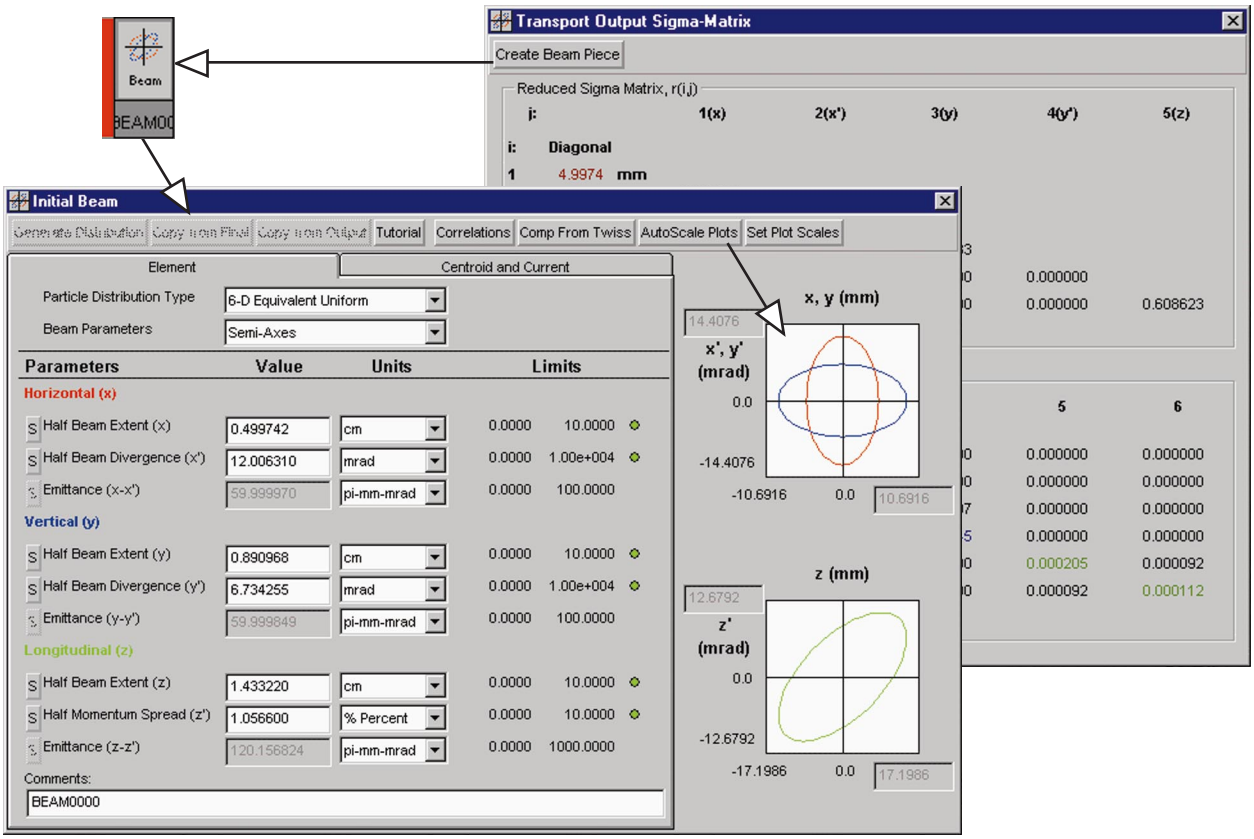
Tips, Tricks & Shortcuts

Creating Beam Pieces & Matrix Pieces from TRANSPORT results

The new TRANSPORT Application Module for PBO Lab 2.0 has several new capabilities for easily creating Beam Pieces and Matrix Pieces from the data generated in a TRANSPORT calculation (see Section 6 of the TRANSPORT User Supplement). After a TRANSPORT calculation has been run, the R-matrix and Sigma-matrix for that calculation may be displayed in windows using the corresponding Show ... items from the Commands->Transport Menu. New buttons have been added to the tops of these windows that will automatically create a Beam Piece or a Matrix Piece using the data displayed in the windows. The Figure below illustrates an example of using these capabalities to create a new Beam Piece from the output beam calculated by TRANSPORT for the "Example B - Mod After Fit" model.



George Coutrakon User Profile

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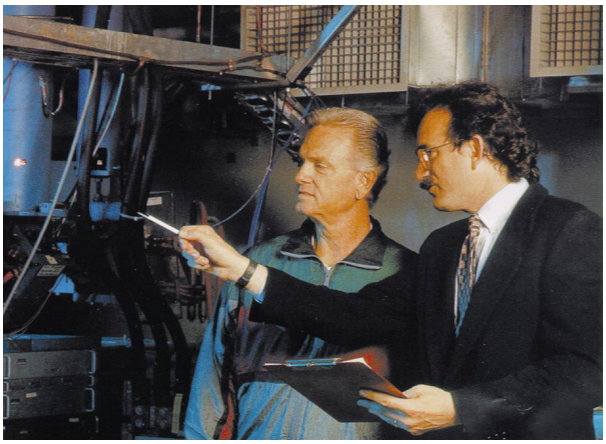
Dr. Coutrakon received his Ph.D. in Physics with a specialty in high-energy physics from the State University of New York in 1983. He went on to complete five years of post-doctoral experience at Fermilab until 1987, when he began his work at Loma Linda. In his spare time, Dr. Coutrakon flies light airplanes, a hobby he has enjoyed for seventeen years now. He even has his own plane, which he keeps in Redlands, California.

We wish Dr. Coutrakon continued success with his work at Loma Linda's Proton Therapy Center. We appreciate his willingness to provide to our readers his feedback on PBO Lab.



Dr. Coutrakon (right) in his role as Director of Accelerator Operations of Loma Linda's Proton Therapy Center.

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In Member States of the European Union:

PAC sprl

email: pac.sprl@skynet.be
TEL: +32 10 24 70 77 FAX: +32 10 24 72 20

www.ghga.com/accelsoft

AccelSoft™
P.O. Box 2813
Del Mar CA 92014