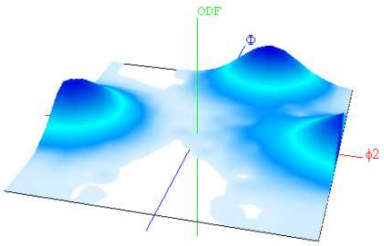
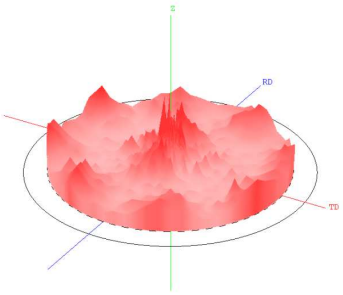
LAB SOFT

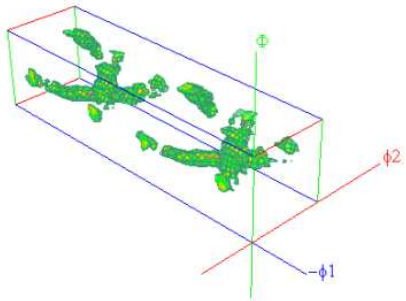
LaboTex

The Texture Analysis Software

LaboTex software is a Windows tool for complex and detailed analysis of crystallographic textures. This user-friendly program performs various calculations and graphic analyses of Orientation Distribution Function (ODF), Pole Figures (PFs) and Inverse Pole Figures (IPFs).





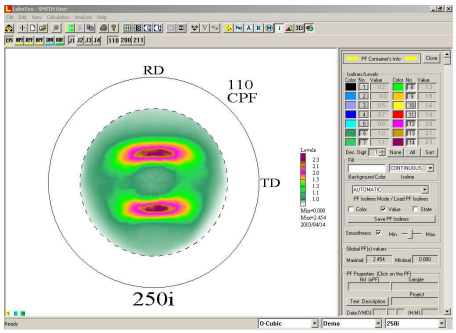


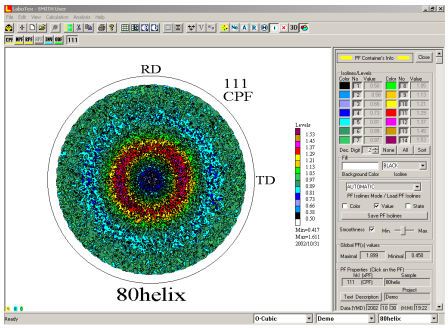
Main Advantages of the Program

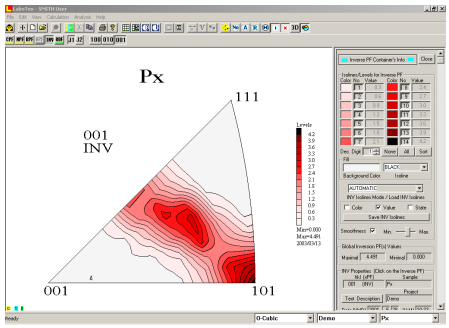
- ODF calculation by ADC method with ghost correction

> *"... The strong and weak points of each method are examined showing that the iterative discrete methods (**ADC** and WIMV) are better suited for the reproduction of the texture function in the present case. In comparing these two discrete methods, it is **evidenced that the ADC method reproduces more accurately both the experimental and synthetic texture functions over the entire range of texture sharpness considered** ..." F.Caleyo, T.Baudin, M.H.Mathon and R.Penelle - Comparison of several methods for the reproduction of the orientation distribution function from pole figures in medium to strong textured materials - Eur. Phys. J. AP 15 (2001), p85-96.*

- ODF free from truncation errors of the series
- ODF calculation using both types of experimental data :
  - pole figures
  - or sets of individual orientations
- on-line qualitative and quantitative texture analysis
- ODF, PF and IPF data measured, calculated and presented in a wide range of grid cells
- texture analysis of all types of sample symmetry







- texture analysis for materials of all types of crystal lattice symmetry
- 2D and 3D graphic presentation of ODFs , PFs and IPFs
- simple on-line identification of the orientations, giving its parameters in Euler angles and Miller indices
- creation of additional pole figures and inverse pole figures
- rotations and symmetrizations of experimental pole figures
- export of ODF, Pole Figures and Inverse Pole Figures as ASCII files.
- passing graphical objects to other Windows applications by a clipboard or Export 2D and 3D images as bitmap (BMP, TIF format)
- management of data and results collecting them for users, symmetries, projects, samples and jobs
- fiber texture analysis
- ODF modelling

LaboSoft s.c.

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LaboTex - Technical specifications

Operating System	Windows OS : 2000, XP, 2003
Management of data and results	Simple access to data and results. Collecting them for users, symmetries, projects, samples and jobs.
Application Ranges	Texture analysis for materials of all types of crystal lattice symmetry and of all types of sample symmetry (also fiber textures).
ODF calculation	Direct - ADC Method (the best ODF calculation method). Ghost correction. No truncation errors of the series. Calculation of fit error (RP). Calculation of texture index (F^2). High resolution ODF option. ODF calculation report. ODF calculation using pole figures and single orientation sets. ODF calculation from incomplete pole figure(s). Information about too small number of data for ODF calculation. Choice of the symmetrization of pole figures before ODF calculation (viewing of symmetrized PF). Choice of the sample symmetry for ODF (ODF symmetrization, available after ODF calculation). Parameters of ODF calculations: number of iterations (1-70), RP and dRP finishing calculation (0.1-10%). Choice of convention for hexagonal system. Possibility of the ODF calculation for different parameters for the same sample (up to 9 jobs for sample).
Pole figures Pole figures comparison	Data from X-Ray or Neutrons measurements. About 30 data formats are available. Limitation for radial angle: 1., 1.2, 1.25, 1.5, 2. ,2.5 ,3. ,3.75 ,5. ,6. ,7.5 ,10. degrees and extra: 1.8 ,2.25 ,3.6 ,4.5 but with exceptions: trigonal and hexagonal crystal lattice symmetry. If azimuthal angle step is different from radial step, azimuthal step is adjusted to radial step by linear interpolation. Azimuthal step has to be in the range 1-10 deg. Available pole figure symmetrization : triclinic to monoclinic, triclinic to orthorhombic, triclinic to axial, monoclinic to orthorhombic, monoclinic to axial, orthorhombic to axial, custom to axial. Possibility of the rotation of pole figure(s) before ODF calculation (for all pole figures or separately in range -90 to 90 degrees). Possibility of the cutting off the pole figure(s) in the center and in the edge before ODF calculation (for all pole figures or separately, user choose angle ranges). 9/-9 maximal/minimal value of Miller indices H,K,L for input PF. User defined grid for pole figures. Pole figures sections (cuts). There are following cuts available: 'Arc' (in range 0 to 360 degrees) ; 'Radial' (in range 0 to 90 degrees); 'Radial (full)' (in range 90 - 0 - 90 degrees) . Up to 12 pole figures can be comparised.
Correction of pole figures	Defocussing and background corrections. Correction for defoccusing using powder pole figure, from correction coefficients or from Schulz equation. Information when background values are greater than pole figure data values (LaboTex displays percent of these data). Choice of the correction method for background.
Pole figures conventions	Choice of the pole figures plot convention. User can choose to start plotting pole figures from "N","E","S" or "W". User can also adjust description of pole figure axis (for example denotation 'RD') to new plot convention. User can adjust the pole figures registration convention to LaboTex convention. Options: counter-clockwise, +90 deg pole figure rotate, +180 deg pole figure rotate. User can set up default for the registration convention for each available format of the pole figures
Single orientations	Data from EBSD, model calculation and other (weights of orientations are also accepted). Roe/Bunge notation of angles. Choice of ODF grid (ODF from SOR). Choice of sample symmetry after ODF calculation (ODF symmetrization).
Inverse, Recalculated and Additional Pole Figures	Creations of pole figures from ODF.: complete, recalculated pole figures (RPF), complete inverse pole figures and complete additional pole figures (APF). User input only HKL or XYZ.
Modelling of ODFs, pole figures and inverse pole figures.	User can choose: crystal symmetry, sample symmetry, grid cells for output ODF and up to 10 components. For each texture component user can choose: volume fraction, FWHM for each Euler angle (ϕ_1, Φ and ϕ_2), distribution (Gauss or Lorentz). User can create from model ODF any model pole figures or/and any model inverse pole figures using appropriate dialog to create APF (additional pole figures) or IPF (inverse pole figures). Model ODF is created as a new job or as a new sample.
ODF Transformations	ODF transformation - LaboTex calculates new ODF which is result transformation of initial ODF in consequence of : 1) user defined frame rotations 2) user defined crystallites rotations. Builder of model rotations is available. User can set up: ranges of Euler angle around centre of orientation; vector "hkl" around which will be rotate crystallites, rotation angle, percent of rotated crystallites.
Comparison of ODFs Skelton lines ODFs - logical operations Misorientation histograms	Comparison up to 12 ODFs is possible. ODF line sections. Skeleton lines for options: maximal intensity, integral intensity. User can create such diagrams as: alpha-fiber, beta-fiber, gamma fiber etc. Misorientation histograms. Logical comparison operations: LaboTex can create new ODF which is: intersection of ODF A and ODF B, difference of ODF A and ODF B (or B-A), union of ODF A and ODF B, sum of ODF A and ODF B, ODF difference : A or B - intersection A and B, inverted ODF (only for A).
Databases	100 positions for each crystal system. User can input to database any orientation. Orientation is also denotation of component. In texture analysis LaboTex shows all sym. equivalent positions (orientations) for component(orientation) from database. User can input orientations (components) to database in Miller indices ({HKL}< UVW>) or in Euler angles. Equivalent Euler angles for {HKL}< UVW> depend on cell parameters when crystal symmetries is lower than cubic. LaboTex automatically calculates Euler angles on the base of the cell parameters for components(orientations) in Miller indices. Fiber orientations (components) can be also added to database (< HKL>fiber).
Qualitative Texture Analysis Automatic and manual detection of texture components	On-line identification of the texture components by current cursor position. LaboTex also sorts orientations from database by current PF/ODF values (automatic detection of main texture components on the base of database) . LaboTex creates ready to print and copy report from qualitative analysis. LaboTex displays orientation and their symmetrically equivalent position (orientations) from database on the ODF and PFs (automatic, semi-automatic and manual mode are available). Compare orientation analysis: LaboTex shows simultaneously orientation in two windows (ODF - ODF, ODF - ODF section, ODF - pole figures, ODF section - pole figures, pole figures - pole figures). LaboTex also helps in finding close to cursor position orientations in Miller indices on the ODF and PF (near orientations are sorted by: PF/ODF value, Miller indices, distance). User can set up maximal value of Miller indices in conversion from Euler angles (in the range 5 to 15).
Quantitative Texture Analysis - (Volume Fraction of Texture Components) Two methods available!	User can use 2 methods: Integration and/or Model Functions. Up to 10 texture components simultaneously can be calculated. The possibility of the choice of the components from files or from database. Choice of integration ranges (for each Euler angle separately with the viewing). 3 different methods calculation of volume fraction in Integration Methods. Display of orientation overlapping. Correction of overlapping (division of ODF among overlapping orientations). Reports from calculation of volume fraction of texture components ready to print or copy. For each texture component user can choose the following initial parameters for fitting calculation: volume fraction, FWHM for each Euler angle (ϕ_1, Φ and ϕ_2), distribution (Gauss or Lorentz). Automatic and Manual "one step" choice of the mode of work during calculation of volume fraction in Model Function Methods. In manual mode LaboTex calculates relative error between experimental ODF and model ODF made by user. In automatic mode LaboTex fits model parameters (angles and volume fraction) to optimal values. Comparison of 'experimental' ODF with best fit model.
Export	Export of ODF, Pole Figures and Inverse Pole Figures as ASCII files. Export 2D and 3D images as bitmap (BMP, TIF format). Export of ODF as a set of single orientations. LaboTex can create a set of single orientations on the base of current ODF. LaboTex can create a set of random single/discrete orientations.
2D and 3D presentation	Up to 100 pole figures or inverse pole figures in one plot. Pole figures description (HKL,sample name, directions, type of figure. Turn off - separately for each description kind). Four modes in fill option: normal/black/white and continuous. 15 user defined sets of colors. Isolines modes: automatic, manual, from user defined sets. Maximal number of isolines: 14. 2D/3D ODF presentation for ϕ_1, Φ and ϕ_2 projections. 2D/3D ODF presentation for section of projection. 3D ODF presentation. 3D animation. ODF for Bunge definition of Euler angles. Arrangements options. Drawing basic region of PF/INV (fund. triangle).
Manuals	Several manuals are available: Introduction to LaboTex, Menu and Toolbars Commands, Pole Figure Conventions, Inverse Pole Figures Nomenclature, Determination of Volume Fraction of Texture Components Using LaboTex.
Examples	Demo version is available*. 16 examples for different sample symmetry and for different crystal symmetry are available.
Recommended configuration	Processor 2GHz or higher (P4®,Athlon®), 1 GB HD space, graphic card resolution 1024x768 (+OpenGL), CD-ROM drive, USB.

Specification for LaboTex Version 3.0.006, * Demo is available only for old LaboTex Version 2.1.012