P_Scope® – A Virtual Polariscope

Comprehensive Software for Understanding Whole Field Stress Analysis

Developed at
Digital Photomechanics Lab
IIT Madras

Transform a Computational Laboratory to an Experimental Laboratory

P_Scope® is an innovative software that simulates conventional/generic polariscopes using Jones calculus for eight different problems for which theory of elasticity solution exists. It can also plot isochromatic and isoclinic phasemaps to understand the nuances of Digital Photoelasticity. The parameters governing the problems can be changed to customize the simulation. A variety of light sources and model materials can be selected. Other features include plotting of *isopachics*, all *isoclinics,* influence of carrier fringes, zoom –in/out etc.

The software can plot whole field stress component plots. Thirty years of teaching experience has gone into the making of the software. A tool to innovatively integrate experimental information for improved clarity in courses such as **Strength of Materials, Theory of Elasticity, Fracture Mechanics, Experimental Stress Analysis, Optics and Biomechanics** *(Orthopedics, dentistry and rehabilitation studies use photoelasticity)* and enhance learning experience**.** The software is embedded with a laboratory manual containing ten different virtual experiments with ten variations each to easily adopt and conduct laboratory classes.

About the Author Professor K. Ramesh is a Fellow of the Indian National Academy of Engineering and a Distinguished Alumnus of NIT Trichy. He has over 200 publications and has authored a Monograph, two textbooks and two e-books. He has delivered video lectures on Engineering Mechanics, Strength of Materials, Experimental Stress Analysis and Engineering Fracture Mechanics (Available free in YouTube). Written several book chapters and developed several educational software.

Standard problems that can be simulated in P_Scope®:

1. Circular Disc
2. Ring under diametral compression
3. Thick Cylinder
4. Semi infinite plate (Load at any orientation)
5. Plate with a hole (σ_x, σ_y)
6. Beam problems (Pure bending, Cantilever, UDL, 3-point bend)
7. Crack problem (Mode-I, II)
8. Contact problem (Hertzian with and without friction)

https://home.iitm.ac.in/kramesh/p_scope.html

Windows OS.
Compatible with Desktop/Notebook PC's
Available as a network version for easy running of the laboratory.
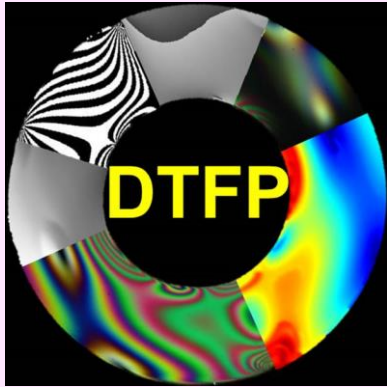Copyright © 2017, IIT Madras

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See overleaf on how to order

*Digi*TFP®- Digital Twelve Fringe Photoelasticity

Robust Software for Whole Field Evaluation of Isochromatics and Isoclinics using White Light

Developed at
Digital Photomechanics Lab
IIT Madras

Transform a Conventional Polariscope into a Digital Polariscope

*Digi*TFP® is capable of exploiting the colour information to extract both isochromatic (difference in principal stresses) and isoclinic (principal stress direction) parameters over the model domain using the latest developments of digital photoelasticity. It can provide isochromatic results from a single dark field colour image. In case one requires the isoclinic data also, the software would require four plane polariscope images recorded in colour having 0°, 22.5°, 45° and 67.5° isoclinics. It also has an advanced feature to extract isochromatic data from these isoclinic images. It accepts images in TIFF and BMP formats and also individual image planes.

Useful for **shape optimisation**, determination of stress concentration factors, **weight reduction** etc., in design offices. Validate the numerical model such as Finite Elements for further parametric analysis. Aides phenomenological understanding of complex mechanics in several applications. Useful for defect identification in photoelastic coatings. Easy to use by doctors too.

About the Author Professor K. Ramesh is one of the pioneers of Digital Photoelasticity Internationally. He is credited with the first Monograph on *Digital Photoelasticity – Advanced Techniques and Applications*, Springer, 2000, a chapter on *Photoelasticity* in the *Springer Handbook of Experimental Solid Mechanics,* 2008*,* and recently a book on *Developments in Photoelasticity – A Renaissance*, IOP, 2021*.* Received the 2012 **Zandman Award** from Society for Experimental Mechanics (**SEM**), USA for outstanding contributions in Photoelastic Coatings and 2023 **M M Frocht Award** for outstanding contributions as an educator in the field of Experimental Mechanics.

Features
1. The GUI is made user friendly so that professionals from all disciplines (Stress Analysts, Dentists, NDT professionals, Glass engineers etc.) can easily use the software.
2. Has a special *Message Box* that pops up for each major menu item to guide the user.
3. Has sophisticated in-built smoothing module to smooth acquired data.
4. Zoom feature for generating mask, export results in Excel and MATLAB®.

https://home.iitm.ac.in/kramesh/dtfp.html

Windows OS.
Compatible with Desktop/Notebook PC's

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