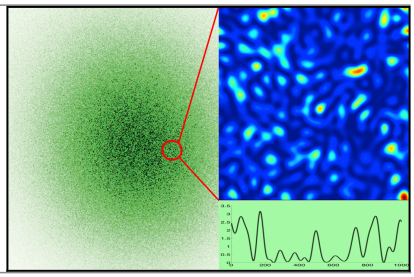
INSTITUT d'OPTIQUE GRADUATE SCHOOL | Continuing Education
Formation Continue

SC20 | Understand and use speckle in imaging systems



Nouvelle Formation

NIVEAU : ADVANCED

Publics : Senior technician, engineer or project manager, researcher, having basic knowledge in optics and willing to investigate speckle imaging

Prérequis : Basic knowledge in physical optics (difraction and interferences)

Responsable(s) pédagogique(s) : Vincent Josse - Enseignant-chercheur à l'Institut d'Optique

Langue de la formation : French

Capacité maximum : 12

Prix : 1380€ HT - **Durée :** 3 days - 21 h

Objectifs

Intuitive understanding of the origin of speckle

Know its main properties (size of the speckle grain, size of the speckle halo and probability distribution)

Understand the applications of speckle in imaging systems (from Fourier to subjective speckle)

Thèmes abordés

Coherent optical propagation
Fourier and subjective speckle
Coherent and incoherent imaging
Applications to imaging through complex media or measurement of surface defects

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Le programme

Reminder of the basics of coherent optics
- Huyghens-Fresnel's principle
- Fresnel's propagation and Fraunhofer's diffraction
- Spatial coherence (definition and intuitive understanding)

General properties of speckle fields
- Intuitive understanding of the origin of the speckle pattern
- Link with spatial coherence
- Study of statistical properties (intensity probability distribution, size of speckle grain and speckle halo)
- Influence of the diffuser on speckle properties

Speckle and imaging optics
- Fourier speckle: case of a perturbation (diffuser) in between the objet and the image. Example: atmospheric turbulences in astronomy
- Subjective speckle: speckle pattern superimposed on the image when imaging a rough object. Example: coherent radar imaging

Experimental practice
- Study elementary speckle properties (both Fourier and subjective speckle)
- Applications of speckle for measuring surfaces deformations (digital speckle pattern interferometry)

Méthodologie et évaluation

Lectures with instructive example - Intuitive approach of speckle properties
Interactive experimental demonstrations
Experimental hands-on