



Internship at Tortoise: using data science in fracture mechanics to improve materials' reliability and durability

Tortoise has developed an innovative technique known as statistical fractography, that uses the power of data science to measure the mechanical strength of materials from the scan and the analysis of their fracture surface. Today, this technique is used to explain and ultimately avoid mechanical accidents that may happen in the industry.

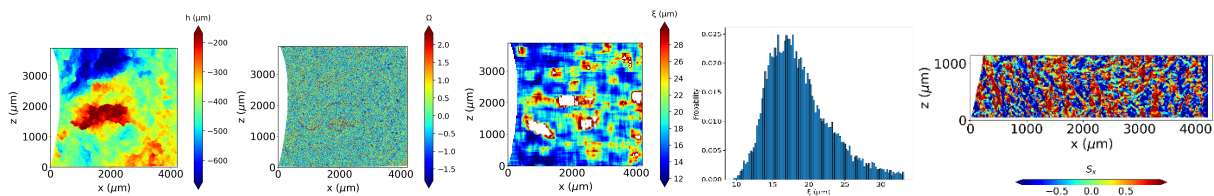
This technology is based on the statistical analysis of the geometry of fracture surfaces (see Figure below for an example of analysis of the surface of a fractured metallic alloy). The roughness of fractured materials displays fractal features from which emerge some length scales that are related to the mechanical strength of materials.

Today, our technology efficiently measures these length scales from which the mechanical strength of materials is then inferred. This approach has firmly established its effectiveness in analyzing metallic alloys and ceramics failures. The next step is to improve the robustness of our algorithms to develop a commercial software. We are currently developing new methods to measure these length scales, that may be more robust to experimental bias and noise.

During this internship, you will work with our team of data scientists and material engineers to investigate the fracture surfaces morphology and their properties. Your research project will include:

- Acquisition of the fracture surface topography by means of optical profilometry
- Characterisation of the topography of fracture surfaces using dedicated statistical techniques
- Development of new and more robust techniques of fracture surface analysis through the study
 - of the sensitivity of our analysis to trends and experimental noise in the data
 - of new approaches (wavelets transforms) to analyse the roughness of fracture surfaces

KEYWORDS: Fracture mechanics, **data science**, **image processing**, statistical analysis



TORTOISE IN A NUTSHELL: Tortoise is a young start-up winner of the I-Lab innovation prize, dedicated to helping the industry enhance materials' reliability and durability. Our team consists of passionate researchers and engineers who are committed to promoting science in society. Website: www.tortoise.io

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