



# Laboratoire de Mécanique des Solides

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## Séminaire du LMS

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### **On elasticity tensor of (un)cracked media**

Using polar decomposition of Verchery [1, 2] we investigate in 2D the induced anisotropy due to the presence of (non-interacting) cracks in an initially isotropic linear elastic material, either open or closed (sliding with no friction, lubricated approach [3, 4]). Seeking for tensorial expressions we obtain an intrinsic form of polar decomposition. This defines so-called Tensorial Polar Decomposition [5]. The link with harmonic decomposition of (major) symmetric fourth order tensors is made and an extension to 3D is proposed [6]. Hidden in Verchery work is present the decomposition of harmonic fourth order tensors. Three new results are presented in the 2D case of closed cracks sliding with no friction [7]: the microcracking state is represented by a single 2nd order crack density tensor, the compliance tensor is square symmetric, and two cracks arrays allow to represent the effects of any arbitrary closed microcracks systems, the angle made by the two cracks arrays being  $\pi/4$ .

#### References

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