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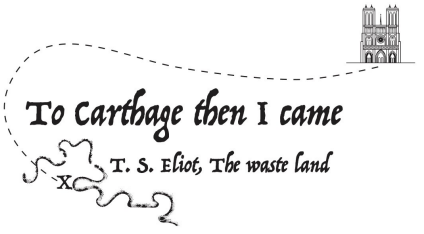


Thursday 19th May
9:30 (Tunis time – GMT+1, UTC+1)

*Mesoscopic model of crystal plasticity*

Despite many important advances of continuum crystal plasticity, the sufficiently versatile computational approach, allowing for natural coupling of different plastic "mechanisms" while addressing realistic space and time scales, is still missing. In this talk we discuss a mesoscopic tensorial model of Ericksen dealing with large strains, while accounting correctly for both anisotropy and discreteness of the underlying lattice. Behind this approach is the assumption that meso-scale material elements are exposed to an effective energy landscape which is globally periodic due to the presence of lattice invariant shears. The resulting field theory is described by a potential with an infinite number of equivalent energy wells. From the perspective of such Landau-type theory, inelastically deformed crystal can be seen as a multi-phase mixture of an infinity of equivalent "phases". Plastic yield is interpreted as an escape from the reference energy well and plastic "mechanisms" can be linked to low-barrier valleys in the energy landscape. Friction type dissipation of crystal plasticity emerges in such theory as a result of a homogenized description of an overdamped athermal dynamics in a rugged energy landscape. The internal length scale (small scale cutoff) is brought by the assumption that each mesoscopic element deforms homogeneously. We discuss some recent applications of the theory.