



ESPCI
Laboratoire PMMH
10 rue Vauquelin, 75231 Paris Cedex 05



Séminaire PMMH

Vendredi 5 mars 2021, 11h00-12h00

Jérémy Hure

CEA - Saclay

Plasticity and ductile fracture in irradiated metals

Metals used in nuclear reactors core are subjected to neutron irradiation, leading to different kind of crystallographic defects depending on irradiation conditions. The main irradiation defects include dislocation loops and nano-voids. These defects have a strong influence on plasticity mechanisms, and, in turn, on fracture mechanisms. In a first part, the physics of irradiation defects creation and their influence on plasticity such as hardening and strain localization will be reviewed. In a second part, the influence of irradiation defects on ductile fracture through void growth to coalescence will be discussed based on model experiments. The first experimental methodology uses irradiated thin plates with model voids to assess the interaction between strain localization and ductile fracture. The second methodology aims at assessing size effects associated with nano-voids. In a last part, based on the experimental observations, homogenized ductile fracture model at the single crystal scale will be briefly described, as well as numerical simulations of ductile fracture. Finally, current challenges on the understanding of the physics and mechanics of irradiated metals will be presented.

