



**Patrick Le Tallec**

Director of the Solid Mecanic Laboratory, Head of the department  
of Mechanics, Energetics and Process at University of Paris Saclay (France)

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Université de Technologie de Compiègne  
Amphi du Centre d’Innovation  
Avenue de Landshut  
60200 Compiègne

**A new strategy for calculating damage by fatigue in the presence of multiaxial loads  
with high variability in time.**

*Ma Zepeng, Patrick Le Tallec, Habibou Maitournam*

**Abstract:**

The aim is to develop fatigue calculation strategies for structures subjected to highly variable multiaxial loads. The principle of the approach is to consider that the damage is driven by the energy dissipated on a mesoscopic scale. For a residual microscopic elastic regime, it is assumed by taking Dan Van's paradigm that due to the presence of a random distribution of microdefects there exists a distribution of spatial scales on which the material is locally regime plastic. Assuming that this distribution of scales obeys a power law, the integral of the plastic dissipation on all these scales makes it possible to construct a law of damage by fatigue. This approach makes it possible to find the classical laws of Chaboche and Lemaitre for cyclic uniaxial loadings, but it has the advantage of also applying to situations of multiaxial loadings and without any notion of loading cycle

**Bio:**

Patrick LE TALLEC field of research is concerned with computational mechanics. A part of his career was devoted to Augmented Lagrangian and operator splitting methods in nonlinear mechanics, to the numerical analysis and simulation of nonlinear elastic problems, to domain decomposition techniques and to fluid structure interaction problems. His current interests concern the multiscale and multimaterial modelling and identification for nonlinear structures such as decomposition techniques for large problems with multiple contacts and friction at different scales, advanced modelling of elastomers using a continuous transition from mesoscopic to macroscopic scales, study of multimaterial systems in hypervelocity regimes, or Multiphysics modelling of nuclear reactors.

Graduate from Ecole Polytechnique (X73), he holds a Ph. D from the University of Texas at Austin (1980), and a thèse d’Etat from Université Pierre et Marie Curie in Paris (1981). After ten years as Professor of Applied Mathematics at Université of Paris Dauphine, he is now Professor of Mechanics at Ecole Polytechnique in Paris, holder of the chair André Citroën, head of the Laboratory of Solid Mechanics, head of the department of Mechanics, Energetics and Process at University of Paris Saclay, visiting professor of various international universities and scientific adviser at French CEA. He has directed more than 35 Ph. D students, authored and coauthored seven books on the above topics, together with more than seventy five refereed papers in international journals. He has been a long time collaborator with industrial companies such as Michelin or Dassault Aviation. He was editor of the International Journal of Numerical Methods in Engineering and is member of the editorial board of Computer and Structures and of Computer Methods in Applied Mechanics and Engineering and AMSES. He is Chevalier de la Légion d’Honneur, Officier de l’Ordre National du Mérite and Chevalier des Palmes Académiques.