Professor Stéphane P. A. Bordas

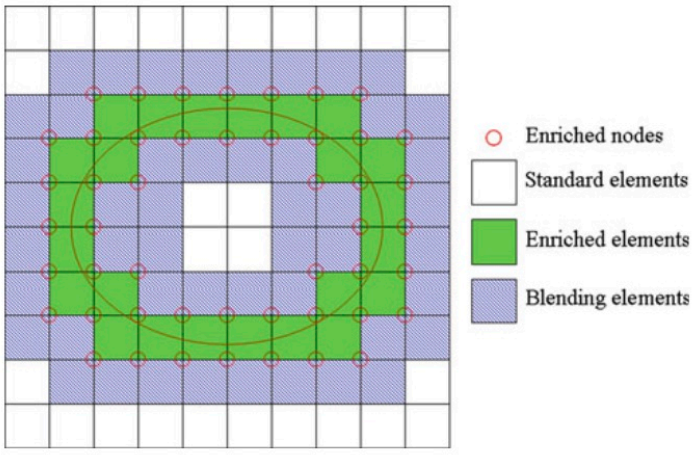

Fig. 3 Enriched nodes (marked by *red circles*) which have additional degrees of freedom due to enrichment; enriched elements (marked by *green squares*) cut by the interface whose nodes are all enriched; blending elements (marked by *blue squares*) in which only part of the nodes are enriched

From: Xujun Zhao, Stéphane P.A. Bordas and Jianmin Qu, "A hybrid smoothed extended finite element/level set method for modeling equilibrium shapes of nano-inhomogeneities", Computational Mechanics, 2013, DOI 10.1007/s00466-013-0884-1

See:
https://wwwfr.uni.lu/recherche/fstc/research_unit_in_engineering_sciences_rues/members/stephane_bordas
https://www.researchgate.net/profile/Stephane_Bordas
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http://imechanica.org/blog/700
Stéphane P.A. Bordas http://legato-team.eu/

Faculty of Science, Technology and Communication
Head of data modeling and simulation
University of Luxembourg

Autobiography:
Born in Paris, France in 1975, I joined the Theoretical Applied and Computational Mechanics team at Cardiff University on 1st September 2009, as a Professor and directed the Institute of Mechanics and Advanced Materials since October 2010 to November 2013.
On November 1st, 2013, I joined the University of Luxembourg as a Professor in Computational Mechanics. Before this, I was a lecturer in Glasgow University Civil Engineering Department (2006-2009).
Between 2003 and 2006, I was at the Laboratory of Structural and Continuum Mechanics at the Swiss Federal Institute of Technology in Lausanne, Switzerland, working under the support of Professor Thomas Zimmermann on meshfree point collocation methods and partition of unity enrichment (extended finite elements) with applications to geomechanics.
In 2003, I graduated in Theoretical and Applied Mechanics with a Ph.D. from Northwestern University under the guidance of Professor Brian Moran. My thesis, funded by the Federal Aviation Administration, concentrated

on applications of the extended finite element method (XFEM) to damage tolerance analysis of complex structures, casting design and biofilm growth processes. In addition to the unique support of Professor Moran, this work would never have been possible without Professor James Conley and Professor David Chopp as well as the instruction of Professor Ted Belytschko.
In 1999, through a joint graduate programme of the French Institute of Technology (Ecole Spéciale des Travaux Publics) and the American Northwestern University I completed a dual M.Sc. after a thesis work on Time Domain Reflectometry simulation to assess ground movements with Professor Charles H. Dowding.

Research Interests:
My research area is known as Computational Mechanics. I focus on free boundary problems, i.e. problems where part of or the whole boundary is unknown. For example, I have worked on problems involving topological changes or relatively complex geometries, such as crack propagation, delamination, biofilm growth, cutting in soft tissue. Within this field, I concentrate particularly on:

- Method development (enriched/extended finite elements, meshfree methods, smooth strain finite elements) to reduce the mesh generation burden when treating complex or evolving geometries/topologies
- A posteriori error estimation, aiming at controlling the approximation error during simulations and thus focusing the computational effort where it is really required
- Isogeometric analysis with boundary elements, aiming at simplifying the link between Computer Aided Design and Numerical Analysis (idea from the paper of TJR Hughes in 2005)
- Academic research/industrial applications: bridging the gap (porting novel methods to industrial codes, real-world applications of computational mechanics and novel method development)

Selected Publications:
Rabczuk, T., Bordas, S., and Zi, G. (2007). “A three dimensional meshfree method for static and dynamic multiple crack nucleation/propagation with crack path continuity.” Computational Mechanics, Vol. 40, No. 3, pp. 473–495
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V. P. Nguyen, T. Rabczuk, S. Bordas, and M. Duflot, Meshless methods: a review and computer implementation aspects, _ Mathematics and Computers in Simulation, vol. 79, no. 3, pp. 763 _813, 2008.

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Yang S W, Budarapu P R. Mahapatra D R, Bordas S P A, Rabczuk T. A drkp based adaptive multiscale method for crack growth. Computational Materials Science, 2014 (under review)
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Links to Information:
Plenary talk at DAMAS2017, Kitayushu
http://hdl.handle.net/10993/31720

Plenary talk at XDMS2017, Umeå
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