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MATERIALS BY DESIGN: FROM THE NANOSCIENCE TO THE MACROMECHANICS OF MODERN ARMOR MATERIALS

T. M. Hatem¹ and K. ElKhodary²

ABSTRACT

Modern computer-based predictive methods, such as non-linear finite element methods can be used to shed light upon the physical mechanisms of deformation and failure of armor materials. From molecular dynamics to dislocation dynamics to dislocation-density based plasticity to generalized continuum methods, the details of nano-scale mechanisms to the complex mechanics of structural level failure can be modeled and simulated with the proposed coupled multiscale techniques. This work aims at presenting the potential of computational multiscale methods to predict and help tailor and design new armor materials for improved performance.

¹ Department of Mechanical Engineering, British University in Egypt, Egypt.

² Department of Mechanical Engineering, American University in Cairo, Egypt.