

RANDOM FIELD OF GRADIENTS AND ELASTICITY

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Random fields of gradients are a class of model systems arising in the studies of random interfaces, random geometry, field theory, and elasticity theory. These random objects pose challenging problems for probabilists as even an a priori distribution involves strong correlations. Gradient fields are likely to be an universal class of models combining probability, analysis and physics in the study of critical phenomena. They emerge in the following three areas, effective models for random interfaces, Gaussian Free Fields (scaling limits), and mathematical models for the Cauchy-Born rule of materials, i.e., a microscopic approach to nonlinear elasticity. We will outline recent results and will discuss possible applications in nonlinear elasticity theory. If time permits we outline the scaling to the Gaussian Free Field for non-convex interactions.