Pinning, Depinning, and Creep of Topological Defects in Random Media[*]

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An introduction into the *statistical mechanics of pinning phenomena* is given. Pinning of topological defects (dislocation lines, domain walls, flux lines etc.) allows a hardening of material (mechanical, magnetic, superconducting etc.) properties. The basic concepts of pinning like weak and strong pinning, roughness, Larkin length, barriers etc. are introduced using semi-quantitative Imry-Ma like arguments. Since perturbative calculations break down in random system on length scales larger than the Larkin length, the renormalization group theory has to be applied to describe pinning phenomena on large scales or for small driving forces. This will be discussed briefly.

In the second part of the talk the thermally activated creep of topological defects and the zero temperature critical depinning are reviewed and new results on depinning phenomena in an ac-field will be presented.