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## **Solitary Waves and Fluctuations in Fragile Matter**

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PROPOSITONS  
accompanying the thesis  
SOLITARY WAVES AND FLUCTUATIONS IN  
FRAGILE MATTER

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- The simple approximate description of the solitary wave as a quasi-particle first introduced by Nesterenko, also helps to understand the interaction of the solitary wave with an interface and by extension, the solitary wave propagation in a weakly disordered medium.  
*This thesis Chapter 2,3.*
- The disorder in an initially jammed amorphous packing that is near its critical point, causes the disintegration of the nonlinear excitation. This in turn leads to the emergence of a fluid-like state.  
*This thesis Chapter 4.*
- The dynamics of the Nesterenko solitary wave quasi-particle propagating along a one-dimensional chain coupled to a source of thermal fluctuations, can be described in analogy with that of a Brownian particle.  
*This thesis Chapter 5.*
- A two-dimensional nearly isostatic random network of harmonic springs that is being sheared at a uniform rate, generates a nonlinear shock-like wave whose width grows super-diffusively with time.  
*This thesis Chapter 6.*
- The role of fluctuations and nonlinearity can not be ignored in describing the equilibrium properties of a one-dimensional Navier-Stokes fluid.  
*V. Yakhot and Z. She, Phys. Rev. Lett., 60, 18 (1988).*
- The absence of phonons in a perfectly ordered lattice of unstressed nonlinear springs leads to nonlinear waves as the elementary excitations.  
*V. F. Nesterenko, A. N. Lazaridi, and E. B. Sibiriyakov, Prikl. Mekh. Tekh. Fiz. 36, 19 (1995)[J. Appl. Mech.Tech. Phys., 36, 166 (1995)].*

- The mechanical properties of a random network of harmonic springs can be tuned by changing the average number of neighbours that each node is connected to.  
*M.F. Thorpe, Journal of Non-Crystalline Solids, 57 (1983) 355-370.*
- An approximate way to model quantum fluctuations within classical molecular dynamics simulation is by coupling the system to a heat bath that has a power spectral density given by the Bose-Einstein distribution.  
*H. Dammak et. al. , Phys. Rev. Lett. 103, 190601(2009).*
- Even calligraphically, 'T' stands as a tall barrier between you and me.