Spinwaves in Textures & Solitons

Albuquerque, NM, United States of America
paris.smb.0@gmail.com

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Abstract

The conventional approach to spinwaves is the continuum approximation; for which some simple solutions for bi-partite lattices are known; with the inclusion of discrete systems; for which the continuum approximation is destined for failure in the strong coupling limit. Departures from spin trajectories make the approximation one for which we cannot satisfy the conclusion that the coupling is stronger than the given spacing parameter. When a non-linear analysis is instead supported by that of tension and torsion as parameters; the solutions manifest as elliptical in nature; to which there can be found exact discrete solutions. These exact discrete solutions interpolate between the discrete periodic lattices and that of the continuum; and promote the introduction of non-linear quasi-solitons; to which there is periodic behavior. The understanding of a discrete non-linear analysis of superposition and interaction is found to be of necessity in the finding of a solution to therefore many systems of interest; including the bi-partite lattice and that of the Ising model to describe crystals.

Discrete Ising Model

We begin with the discrete ising model; to which solutions have not aforementioned been found; and it is to that which we find at odds the characteristic length scale; we will not go into a proof that the strong coupling limit defies the discrete to continuum translation; but instead impose boundary conditions on the model; to which there appears manifest a singular nature to the solutions; of which the algrebraic functions translate into transcendental functions of elliptic variety in the one-dimensional system with isotropy:

$$\frac{\partial \vec{S}_j(x,t)}{\partial t} = J\vec{S}_j(x,t) \times (\vec{S}_{j-1}(x,t) + \vec{S}_{j+1}(x,t)) \qquad \forall j \tag{1}$$

One can go to the continuum; but we devote our time to finding discrete elliptical solutions; for the sake that the strong coupling limit fails with the exchange constant when departures from linearity manifest.
Testing the ansatz:

$$\vec{S}_j(x,t) = \eta(x,t)(\alpha_j sn(\hat{\omega}(x,t),m), \beta_j cn(\hat{\omega}(x,t),m), \gamma_j dn(\hat{\omega}(x,t),m)) \tag{2}$$

With:

$$m = \frac{v^2}{c^2} \qquad \hat{\omega}(x,t) = E[m]\frac{2}{\pi}(x - vt) - \phi_j \tag{3}$$

Time dilation imposes a nonlinear factor to which regularizes tension and torsion; and admits a phase which can comparably (and discretely) change from lattice site to lattice site.

1 Imposition of Relativity

We know from the differential equation governing the elliptic functions:

$$(\frac{dy}{dt})^2 = (1-y^2)(1-k^2y^2) \tag{4}$$

That the differential of the time dilation squared is the integral of a comparative Lorentz factor for the two sublattices of spin in the bi-partite lattice; to which $(\frac{dy}{dt})^2 = \eta(x,t)$.
Which is to that of the differential equation the source of the left hand side; and which is the local contraction of Lorentz factors; to which the differential equation (1) becomes:

$$\frac{\partial \vec{S}_j(x,t)}{\partial t} = (\partial_t \log \eta)\vec{S}_j(x,t) + (\hat{\alpha}_j cn(\hat{\omega})dn(\hat{\omega}), \hat{\beta}_j sn(\hat{\omega})dn(\hat{\omega}), \hat{\gamma}_j sn(\hat{\omega})cn(\hat{\omega})) \tag{5}$$

Where:

$$\hat{\alpha}_j = -E[m]\frac{2}{\pi}\nu\alpha_j \tag{6}$$

$$\hat{\beta}_j = E[m]\frac{2}{\pi}\nu\beta_j \tag{7}$$

$$\hat{\gamma}_j = -E[m]\frac{2}{\pi}m\nu\gamma_j \tag{8}$$

Where use of the Jacobi summation formulas is used:

$$cn(x+y) = \frac{cn(x)cn(y) - sn(x)sn(y)dn(x)dn(y)}{1-k^2sn^2(x)sn^2(y)} \to 2\frac{cn(x)cn(\phi_\Delta)}{1-k^2sn^2(x)sn^2(\phi_\Delta)} \tag{9}$$

$$sn(x+y) = \frac{sn(x)cn(y)dn(y) + sn(y)cn(x)dn(x)}{1-k^2sn^2(x)sn^2(y)} \to 2\frac{sn(x)cn(\phi_\Delta)dn(\phi_\Delta)}{1-k^2sn^2(x)sn^2(\phi_\Delta)} \tag{10}$$

$$dn(x+y) = \frac{dn(x)dn(y) - k^2sn(x)sn(y)cn(x)cn(y)}{1-k^2sn^2(x)sn^2(y)} \to 2\frac{dn(x)dn(\phi_\Delta)}{1-k^2sn^2(x)sn^2(\phi_\Delta)} \tag{11}$$

Where all odd term's cancel. Describing a phase by $\phi_\Delta = \phi_j - \phi_{j-1}$:

$$\hat{\alpha}_j = -(\partial_t \log \eta)\frac{sn(\hat{\omega})}{cn(\hat{\omega})dn(\hat{\omega})} + 2J\beta_j\gamma_j\frac{\delta_1}{\rho(x,t)} \tag{12}$$

$$\hat{\beta}_j = -(\partial_t \log \eta)\frac{cn(\hat{\omega})}{sn(\hat{\omega})dn(\hat{\omega})} + 2J\alpha_j\gamma_j\frac{\delta_2}{\rho(x,t)} \tag{13}$$

$$\hat{\gamma}_j = -(\partial_t \log \eta)\frac{dn(\hat{\omega})}{sn(\hat{\omega})cn(\hat{\omega})} + 2J\alpha_j\beta_j\frac{\delta_3}{\rho(x,t)} \tag{14}$$

Where:

$$\delta_1 = 2cn(\phi_\Delta, m) \tag{15}$$

$$\delta_2 = 2cn(\phi_\Delta, m)dn(\phi_\Delta, m) \tag{16}$$

$$\delta_3 = 2dn(\phi_\Delta, m) \tag{17}$$

And where $\eta = \nu$ has been cancelled by that of the denominator in the addition formulas; and:

$$\rho(x,t) = 1 - msn^2(x)sn^2(\phi_\Delta) \tag{18}$$

And:

$$\eta(x,t) = \iota nd(\hat{\omega}) \tag{19}$$

Leading to:

$$-(\partial_t \log \eta)\frac{sn(\hat{\omega})}{cn(\hat{\omega})dn(\hat{\omega})} = -\nu E[m]\frac{2}{\pi}\iota m dn(\hat{\omega})sn(\hat{\omega})cn(\hat{\omega})\frac{sn(\hat{\omega})}{cn(\hat{\omega})dn(\hat{\omega})} = -\nu E[m]\frac{2}{\pi}\iota m sn(\hat{\omega})^2 \tag{20}$$

$$-(\partial_t \log \eta)\frac{cn(\hat{\omega})}{sn(\hat{\omega})dn(\hat{\omega})} = -\nu E[m]\frac{2}{\pi}\iota m dn(\hat{\omega})sn(\hat{\omega})cn(\hat{\omega})\frac{cn(\hat{\omega})}{sn(\hat{\omega})dn(\hat{\omega})} = -\nu E[m]\frac{2}{\pi}\iota m cn(\hat{\omega})^2 \tag{21}$$

$$-(\partial_t \log \eta)\frac{dn(\hat{\omega})}{sn(\hat{\omega})cn(\hat{\omega})} = -\nu E[m]\frac{2}{\pi}\iota m dn(\hat{\omega})sn(\hat{\omega})cn(\hat{\omega})\frac{dn(\hat{\omega})}{sn(\hat{\omega})cn(\hat{\omega})} = -\nu E[m]\frac{2}{\pi}\iota m dn(\hat{\omega})^2 \tag{22}$$

And:

$$-E[m]\frac{2}{\pi}\nu\alpha_j(1 - msn^2(x)sn^2(\phi_\Delta)) = -\nu E[m]\frac{2}{\pi}\iota m(1 - msn^2(x)sn^2(\phi_\Delta))sn(\hat{\omega})^2 + 2J\beta_j\gamma_j\delta_1 \tag{23}$$

$$E[m]\frac{2}{\pi}\nu\beta_j(1 - msn^2(x)sn^2(\phi_\Delta)) = -\nu E[m]\frac{2}{\pi}\iota m(1 - msn^2(x)sn^2(\phi_\Delta))cn(\hat{\omega})^2 + 2J\alpha_j\gamma_j\delta_2 \tag{24}$$

$$-E[m]\frac{2}{\pi}m\nu\gamma_j(1 - msn^2(x)sn^2(\phi_\Delta)) = -\nu E[m]\frac{2}{\pi}\iota m(1 - msn^2(x)sn^2(\phi_\Delta))dn(\hat{\omega})^2 + 2J\alpha_j\beta_j\delta_3 \tag{25}$$

Supercondictivity Origins

The magnetic only solution (above) indicates that a renormalization occurs at the magnetic only fixed point in the flow of the theory. Second to this; is the potentiation of inclusion of local to local terms of an electromagnetic variety. The solution given by that of the (above) indicates that when we uniformize and unitarily procure from the electromagnetic solution to a dual in the vector field based contingently around magnetic and electric solutions; that this precipitates electromagnetic symmetry breaking; by that which is a separable contribution to the spin wave geodesic equation. There are only two elements of the theory:

1.) Renormalization to electric only and magnetic only solutions; precipitates superposition in the Dirac to Pauli Exclusion Principle locality violation bridge with logarithmic compensation of geodesic phase of spinwaves to electron mass and time.

2.) Renormalization of the local to global to local theory of the uncertainty relation that derives; precipitates superposition to spontaneous symmetry breaking of the quantum states in light and mass below a threshold set by spinwaves to charge holes.

In continuance; the result is spin charge separation with symmetry breaking precipitating a decoupling of matter from light and wavelengths to which ensure universality of conditional in that of spin and charge (hole or charge) localization in a unitary lowered energy potential.