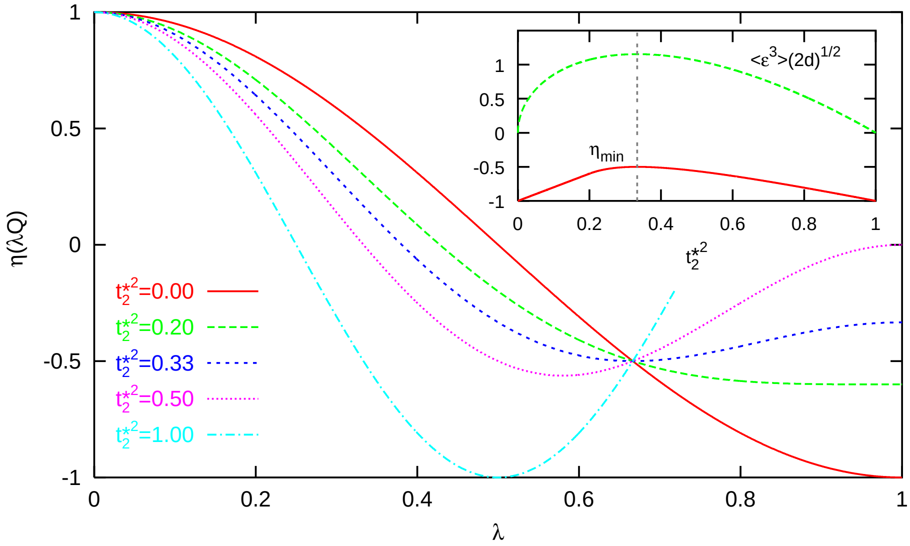

Figure 2.9: DMFT momentum parameter $\eta(\lambda\boldsymbol{Q})$ [(1.23) and (2.20)] for the hypercubic lattice with hopping to NN and to NNN along the cartesic axes using scaled amplitudes $1 - t_2^{*2}$ and t_2^{*2}, respectively. The symmetric graph for $t_2^{*2} = 1$ is not fully shown. Inset: minimal value of $\eta(\boldsymbol{q})$ and rescaled third moment of the DOS as a function of t_2^{*2}; both frustration and asymmetry of the DOS are maximal at $t_2^{*2} = 1/3$.

This value, i.e., the frustration is maximal for $t_2^{*2} = 1/3$ (when $\eta(\boldsymbol{q}) \geq -1/2$ for all $\boldsymbol{q}$). This is exactly the value for which also the asymmetry of the DOS, measured by its third moment, $\langle\epsilon^3\rangle = 6d\, t_1^2 t_2 = 3(1 - t_2^{*2})t_2^*/\sqrt{2d}$ acquires its maximum. Thus, for finite dimensions, maximal frustration coincides with maximal asymmetry of the DOS. This effect becomes only unobservable for $Z \to \infty$ since the associated weight becomes exponentially small.[12] The main part of Fig. 2.9 shows $\eta(\lambda\boldsymbol{Q})$ for different values of t_2^{*2}. The minimum is at $\lambda = 1$ for $t_2^{*2} \leq 0.2$ and approaches $\lambda = 0.5$ for $t_2^{*2} \to 1$ (which is again unfrustrated). The value of the minimum as a function of t_2^{*2} is shown in the inset together with the scaled third moment which illustrates that maximal frustration coincides with maximal asymmetry for $t_2^{*2} = 1/3$. We will find more indications that magnetic frustration is generically associated with an asymmetry of the DOS by using the renormalized perturbation expansion in subsection 2.2.2.

2.2 Bethe Lattice, RPE, and Disorder

Within this work and the DMFT literature in general, the term "Bethe lattice" is most often used in the sense of a lattice having the "Bethe DOS", i.e., a semi-elliptic DOS, without paying too much attention to the particular properties of this pseudo-

[12]Note that the ratio of the band edges, i.e., of the maximum and minimum energies, is independent of d. With respect to this criterion, the asymmetry is maximal for $t_2^{*2} = 1/5$, where the ratio is 0.5 or 2 (depending on the signs of t_1 and t_2).