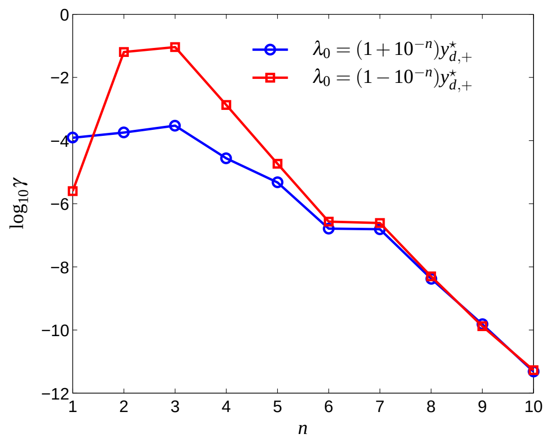

Fig. 7. Mean value of the norm of H_z along the outer boundary of the bottom PML $\gamma = \langle|H_z(-\hat{h}^-)|\rangle_x$, for λ_0 approaching the Wood's anomaly $y^{\star}_{d,+}$ by inferior values ($\lambda_0 = (1-10^{-n})y^{\star}_{d,+}$, red squares) and by superior value ($\lambda_0 = (1+10^{-n})y^{\star}_{d,+}$, blue circles) as a function of n.

5. Conclusion

In this paper, we have proposed an adaptive PML that can treat rigorously Wood's anomalies in numerical analysis of diffraction gratings. It is based on a complex-valued co-ordinate stretching that deals with grazing diffracted orders, yielding an efficient absorption of the field inside the PML. We provided an example in the TM polarization case (but similar results hold for the TE case), illustrating the efficiency of our method. The value of the magnetic field on the outward boundary of the PML remains small enough to consider there is no spurious reflection. The formulation is used with the FEM but can be applied to others numerical methods. Moreover, the generalization to the vectorial three-dimensional case is straightforward : the recipes given in part 3 do work irrespective of the dimension and whether the problem is vectorial. In addition, although the designed co-ordinate stretching is specific to the context of Wood's anomalies, one can adapt this kind of non uniform PML to others wave problems by following the methodology exposed here.

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