Erratum: Critical wetting transitions in two-dimensional systems subject to long-ranged boundary fields [Phys. Rev. E 79, 041144 (2009)]

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In our paper the study of interface localization-delocalization (ILD) transitions allows one to infer wetting transitions in the corresponding semi-infinite systems governed by the Hamiltonian [see Eq. (3) in our paper]

$$\mathcal{H} = -J\left(\sum_{\langle kj,k'j'\rangle}\sigma_{k,j}\sigma_{k',j'} + \sum_{j=1}^{\infty}V_j^{\mathrm{ext}}\sum_{k}\sigma_{k,j} + H\sum_{k,j}\sigma_{k,j}\right), \tag{1}$$

with $J>0$ and the external potential $V_j^{\mathrm{ext}}=\frac{h_1}{j^p}$ with $p>0$. Our numerical data correspond to $h_1>0$ so that at the surface there is a preference for the spin-up phase with magnetization$=+|m_b|$, where $m_b<0$ is the bulk magnetization corresponding to the bulk field $H=0^-$.

For this Hamiltonian the effective interface potential ω at $T=0$ has the form (see Fig. 1)

$$\frac{\omega(\ell,T=0,H=0^-)}{2J} = \begin{cases} h_1\sum_{j=\ell+1}^{\infty}\frac{1}{j^p}, & \ell \geqslant 1 \\ h_1\zeta(p)-1, & \ell=0, \end{cases} \tag{2}$$

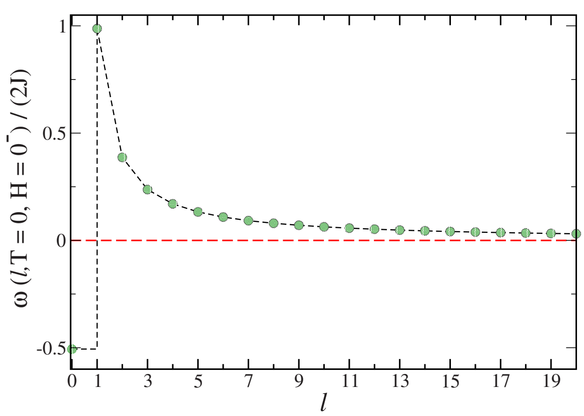

FIG. 1. (Color online) Effective interface potential $\omega(\ell,T=0,H=0^-)/2J$ [see Eq. (2)] for $p=2$ and $h_1=0.3$.

where $\zeta(p)$ is the Riemann zeta function; here the thickness ℓ of the wetting film is taken to be the number of surface layers with magnetization $|m_b|=+1$. The equilibrium wetting film thickness minimizes ω.

At $T=0$ the wetting transition occurs if $\omega(\ell=0)=\omega(\ell=\infty)=0$, i.e., at $h_1=1/\zeta(p)$. For $h_1<1/\zeta(p)$ the system is partially wet. This agrees with the condition for the ILD transition in the strip [see Eq. (9) of our paper). [In the first sum in the last line of Eq. (8) and in Eq. (9) the sum over n should be from 1 to ∞.]

Figure 1 shows that our numerical data cannot be compared with the study in Ref. [1] because the latter corresponds to effective interface potentials which are attractive for large ℓ. Accordingly our findings do not challenge the reliability of effective interface models.

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[1] D. M. Kroll and R. Lipowsky, Phys. Rev. B **28**, 5273 (1983).

