

Errata for *Spectral Theory of Infinite-Area Hyperbolic Surfaces*

David Borthwick
November 5, 2009

Please email any additional corrections to davidb@mathcs.emory.edu.

p. 29: Lemma 2.14

The final formula of the proof should read:

$$\begin{aligned}\text{area}(ABC) &= \text{area}(ACD) - \text{area}(BCD) \\ &= \pi - \alpha - (\gamma + \theta) - (\pi - \theta - (\pi - \beta)) \\ &= \pi - \alpha - \beta - \gamma.\end{aligned}$$

p. 34: range of convergence for $Z_X(s)$

The fact that $\ell(T) \leq d(w, Tw)$ does not imply that

$$\sum_{\ell \in \mathcal{L}_X} e^{-s\ell} < \infty, \quad \text{for } \text{Re } s > \delta.$$

What I should have cited here is the inequality $\ell(T) \geq d(w, Tw) - 2a$ from the proof of Proposition 2.19.

p. 91: Notes

Another approach to meromorphic continuation in higher dimensional conformally compact hyperbolic manifolds was given by Mandouvalos [2, 3, 4], who studied the meromorphic continuation of Eisenstein series in this context.

p. 94: definition of $\psi_n(x, t)$

This definition should read:

$$\psi_n(x, t) = \begin{cases} 0 & \text{if } |x| \geq 1 \text{ or } t \notin [0, n] \\ 1 & \text{if } |x| \leq \frac{1}{2} \text{ and } t \in [1, n-1] \end{cases}$$

p. 169: Notes

The statement that the $O(r^n)$ bound was proven in Cuevas-Vodev [47] is incorrect. They establish the bound for a sector excluding the negative real axis [47, Prop. 1.2], but their proof of [47, Prop. 1.3], which extends the result to the whole plane, is incorrect. I have given a corrected version of this argument in [1].

p. 198–9: proof of Lemma 10.13

Although the existing formula for $Q(s)$ near the top of p. 198 is correct, it should have been written

$$Q(s) = M(s)\chi_3(1 - L_3(s))^{-1}L(s).$$

Then, in (10.61) and (10.62), $(1 - \chi_1)$ can be replaced by the compactly supported function $(\chi_3 - \chi_1)$. Thus the choices for J in the subsequent paragraphs are $(\chi_3 - \chi_1)$ and $[\Delta_X, \chi_0]$, both compactly supported.

In the argument leading up to (10.66), some details were left out of the estimation of $D(s)^{-1}$. Write $D(s) = f_1(s)/f_2(s)$ where $f_1(s)$ and $f_2(s)$ are entire of order 2. Note that the zeros of $f_1(s)$ are contained in the set B defined on p. 197. The minimum modulus theorem, in the form given by Titchmarsh [5, 8.7.1], gives the lower bound

$$|f_1(s)| > e^{-\langle s \rangle^{2+\varepsilon}}, \quad \text{for } s \notin B.$$

(The radii of the disks of B were chosen to meet the hypothesis of this theorem.) Using also the order bound for $f_2(s)$, we obtain

$$|D(s)| \leq e^{C\langle s \rangle^{2+\varepsilon}}, \quad \text{for } s \notin B.$$

p. 216: Lemma 11.5

The hypothesis should be $\psi \in C_0^\infty(\mathbb{R})$.

p. 220: equation (11.27)

The left-hand side should read

$$\int_{-\infty}^{\infty} e^{-i\xi t} \frac{1 - 2\zeta}{\xi^2 + (\zeta - 1/2)^2} d\xi$$

(no Re in the numerator).

p. 325: Theorem A.10

The assumption on f should read “for $f \in L^2(\Omega, d\mu)$.”

p. 334: Fredholm determinant definition

The product range should be $k = 1$ to ∞ :

$$\det(I + A) := \prod_{k=1}^{\infty} (1 + \lambda_k(A))$$

p. 335: 3rd equation

The right side has an extraneous log. It should read:

$$\prod_{j=1}^k (1 + |\lambda_j(A)|) \leq \prod_{j=1}^k (1 + |\mu_j(A)|)$$

REFERENCES

- [1] D. Borthwick, Upper and lower bounds on resonances for manifolds hyperbolic near infinity, *Comm. Partial Differential Equations* **33** (2008), 1507–1539.
- [2] N. Mandouvalos, Spectral theory and Eisenstein series for Kleinian groups, *Proc. London Math. Soc. (3)* **57** (1988), 209–238.
- [3] N. Mandouvalos, Scattering operator, Eisenstein series, inner product formula and “Maass-Selberg” relations for Kleinian groups, *Mem. Amer. Math. Soc.* **78** (1989), no. 400.

- [4] N. Mandouvalos, Scattering operator and Eisenstein integral for Kleinian groups, *Math. Proc. Cambridge Philos. Soc.* **108** (1990), 203–217.
- [5] E. C. Titchmarsh, *The Theory of Functions*, Oxford University Press, 1939.