Erratum

Erratum to: Asymptotics and analytic modes for the wave equation in similarity coordinates

ROLAND DONNINGER

Erratum to: J. Evol. Equ. 9 (2009), 511–523
DOI 10.1007/s00028-009-0022-x

In the original publication of the article, the use of orthogonal projections is incorrect since they do not commute with the semigroups in question. However, the problem is easily fixed by using the correct Riesz projections instead. The results remain unchanged.

1. The free equation

The projection P on p. 517 needs to be constructed as follows. For each analytic eigenvalue λ_j , $j = 1, 2, \dots, 2k$, with (normalized) eigenfunction $\mathbf{u}(\cdot, \lambda_j)$, one defines

$$P_j \mathbf{f} := \frac{f_1^{(j-1)}(1) + f_2^{(j-1)}(1)}{\gamma_j} \mathbf{u}(\cdot, \lambda_j)$$

where $\gamma_j := u_1^{(j-1)}(1, \lambda_j) + u_2^{(j-1)}(1, \lambda_j)$ (it follows from the explicit form of $\mathbf{u}(\cdot, \lambda_j)$ given in the proof of Lemma 3 that $\gamma_j \neq 0$). By Sobolev embedding, one sees that P_j is bounded on $\mathcal{H}^{2k}$ and obviously, $P_j^2 = P_j$. Furthermore, it is straightforward to see that P_j commutes with L_0 . Then, one sets $P := \sum_{j=1}^{2k} P_j$ which gives the correct (nonorthogonal) projection that commutes with the semigroup $S_0(\tau)$. Subsequently, the space $\mathcal{N}^\perp$ needs to be replaced by $\text{rg}(1 - P)$.

2. The semilinear wave equation

Similarly, the orthogonal complement $\mathcal{N}^\perp$ on p. 520 needs to be replaced by $\text{rg}(1 - P)$ where P is constructed as follows. Since the perturbation $L'|_{\mathcal{H}^{2k}}$ is compact, each analytic eigenvalue $\lambda_j^\pm$ with $\text{Re } \lambda_j^\pm > \frac{1}{2} - 2k$ is isolated, and thus, there exists an associated Riesz projection $P_j^\pm$ that commutes with the semigroup $S(\tau)$. From the commutator relation in Lemma 1, it follows that $\dim \text{rg } P_j^\pm = 1$ and one sets $P := \sum_j P_j^\pm$. An updated version of the original article can be found on the arXiv preprint server [1].

Reference

- [1] Donninger, Roland. Asymptotics and analytic modes for the wave equation in similarity coordinates. <http://arxiv.org/abs/0809.5177>.

R. Donninger
Faculty of Physics, Gravitational Physics,
University of Vienna,
Boltzmannngasse 5, 1090 Vienna, Austria
E-mail: roland.donninger@univie.ac.at