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BEYOND THE HODGE THEOREM: CURL AND ASYMMETRIC PSEUDODIFFERENTIAL PROJECTIONS

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We develop a new approach to the study of spectral asymmetry. Working with the operator curl := $*$d on a connected oriented closed Riemannian 3-manifold, we construct, by means of microlocal analysis, the asymmetry operator — a scalar pseudodifferential operator of order -3. The latter is completely determined by the Riemannian manifold and its orientation, and encodes information about spectral asymmetry. The asymmetry operator generalises and contains the classical eta invariant traditionally associated with the asymmetry of the spectrum, which can be recovered by computing its regularised operator trace. Remarkably, the whole construction is direct and explicit, and does not involve analytic continuation or algebraic topology.

This is joint work with Matteo Capoferri (Heriot-Watt University).

References

[1] M. Capoferri and D. Vassiliev, *Beyond the Hodge Theorem: curl and asymmetric pseudodifferential projections.* Preprint arXiv:2309.02015.

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