

Peschl–Minda derivatives on the disk, the sphere and beyond

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We introduce and study invariant differential operators acting on the space $\mathcal{H}(\Omega)$ of holomorphic functions on the complement $\Omega = \hat{\mathbb{C}}^2 \setminus \{(z, w) \in \hat{\mathbb{C}}^2 : z \cdot w \neq 1\}$ of the “complexified unit circle” $\{(z, w) \in \hat{\mathbb{C}}^2 : z \cdot w = 1\}$. We obtain recursion identities, describe the behaviour under change of coordinates and find the generators of the corresponding operator algebra. We illustrate how this provides a unified framework for investigating conformally invariant differential operators on the unit disk \mathbb{D} and the Riemann sphere $\hat{\mathbb{C}}$, which have been studied by Peschl, Aharonov, Minda and many others, within their conjecturally natural habitat.