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Higher analytic torsion forms for direct images and anomaly formulas. (English)

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The authors construct analytic torsion forms associated to Kähler fibrations and establish corresponding anomaly formulas. In §1, one recalls results concerning the Levi-Civita superconnections and Kähler fibrations. In §2, one proves variation formulas for the Levi-Civita superconnection and the corresponding heat kernel supertraces in terms of the (1,1)-form ω of the Kähler fibration. In §3, one constructs analytic torsion forms $T(\omega, h^{\xi})$ associated to Kähler fibrations for nonacyclic complexes, whose cohomology groups form a vector bundle on the base. The main result, Theorem 3.10, describes the dependence of $T(\omega, h^{\xi})$ on ω and h^{ξ}. As a corollary, one proves in Theorem 3.11 that the class of $T(\omega, h^{\xi})$ (modulo ∂ and $\overline{\partial}$ coboundaries) only depends on the natural holomorphic and metric datas of the problem. These anomaly formulas make these analytic torsion forms "natural" in Arakelov arithmetic geometry.

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MSC:

32L05 Holomorphic bundles and generalizations
14G40 Arithmetic varieties and schemes; Arakelov theory; heights
53C05 Connections, general theory

Keywords:

analytic torsion forms; Kähler fibrations; anomaly; superconnections