

Kunz, Ernst; Waldi, Rolf

Regular differential forms. (English) [Zbl 0658.13019](#)

Contemporary Mathematics, 79. Providence, RI: American Mathematical Society (AMS). ix, 153 p. \$ 20.00 (1988).

These notes are both logically and ideologically a continuation of the first author's book "Kähler differentials" [Adv. Lect. Math. (1986; [Zbl 0587.13014](#))] and are devoted to the study of the sheaves $\omega_{X/Y}^q$ of "regular differential q-forms" in the "relative case" i.e. for a morphism $X \rightarrow Y$ of finite type, equidimensional and generically smooth (or even generically a complete intersection). The absolute case (i.e. $Y = \text{spectrum}$ of a field) has been already considered in the literature (cf. work of *Kunz, Kersken*) and is closely related to the study of a Jacobian ideal of a singularity and the integral closure of ideals.

The book is organized as follows. The first three sections are devoted to the construction (based on the notion of linkage) of the modules of relative "integral" and "regular" differential forms and to the study of their relationship. All constructions have a local character so everything is formulated in terms of commutative algebra. - *Section 4* is devoted to the link between regular differential forms and the "generalized" complementary module of an algebra as defined in the cited book of E. Kunz via traces. This should be viewed as a wide generalization of the theory of Dedekind's different (transitivity of the different, formula for the conductor, a.s.o.). - *Section 5* is devoted to the problem of when it is possible to define a fundamental class of X/Y in the sense of *F. Elzein* [Bull. Soc. Math. Fr., Suppl., Mém. 58, 1-66 (1978; [Zbl 0388.14002](#))], i.e. of a natural morphism $\Omega_{X/Y}^q \rightarrow \omega_{X/Y}^q$. The existence criteria are given in terms of local properties of X/Y (e.g. flatness + *generic smoothness* of X/Y are sufficient). - In section 6 the theory is applied to obtain relations between various invariants of curve singularities A (length of \bar{A}/A where \bar{A} is the normalization of A , degree of the conductor of A , Cohen-Macaulay type of A , different degree of A , Milnor number of A).

Reviewer: [A.Buium](#)

MSC:

- [13N05](#) Modules of differentials
- [14H20](#) Singularities of curves, local rings
- [14-02](#) Research exposition (monographs, survey articles) pertaining to algebraic geometry
- [13-02](#) Research exposition (monographs, survey articles) pertaining to commutative algebra

Cited in **7** Reviews
Cited in **21** Documents

Keywords:

[integral differential forms](#); [linkage](#); [regular differential forms](#); [invariants of curve singularities](#)

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