

**Żołądek, Henryk**

**Analytic ordinary differential equations and their local classification.** (English) Zbl 1191.34001  
Battelli, Flaviano (ed.) et al., Handbook of differential equations: Ordinary differential equations. Vol. IV. Amsterdam: Elsevier/North Holland (ISBN 978-0-444-53031-8/hbk). Handbook of Differential Equations, 593-687 (2008).

The author begins by describing the classification of meromorphic systems  $\dot{x} = A(t)x$  near regular and irregular singular points; for the latter he explains the Stokes phenomenon. He presents a local theory of non-linear holomorphic equations  $\dot{x} = V(x)$ , with the resolution theorem and its application to the center-focus problem, with Ecalle-Voronin and Martinet-Ramis moduli and with the Bruno-Yoccoz classification of non-resonant saddles. The presence of these moduli makes the classification of singular points of ordinary differential equations essentially more difficult than the one of singularities of holomorphic functions. The formal classification of nilpotent singularities is also presented and the analyticity of the Takens prenormal form is proved.

For the entire collection see [\[Zbl 1173.34001\]](#).

Reviewer: [Vladimir P. Kostov \(Nice\)](#)

**MSC:**

- [34-02](#) Research exposition (monographs, survey articles) pertaining to ordinary differential equations Cited in **1** Document
- [34M35](#) Singularities, monodromy and local behavior of solutions to ordinary differential equations in the complex domain, normal forms
- [34M40](#) Stokes phenomena and connection problems (linear and nonlinear) for ordinary differential equations in the complex domain
- [32S65](#) Singularities of holomorphic vector fields and foliations

**Keywords:**

[singular points of vector fields](#); [Ecalle-Voronin moduli](#); [Martinet-Ramis moduli](#); [Stokes phenomenon](#); [Stokes sheaf](#); [Stokes matrices](#); [non-resonant saddles](#); [center-focus problem](#)