Brown, Ronald; **Porter, Timothy**

On the Schreier theory of non-Abelian extensions: generalisations and computations. (English) Zbl 0885.20018

Proc. R. Ir. Acad., Sect. A 96, No. 2, 213-227 (1996).

The paper addresses the classification of group extensions $1 \to A \to E \to G \to 1$ of a group A by a group G with an emphasis on the case where A is non-abelian and offers various generalizations thereof. Using the notions of crossed module and of the module of identities among relations [cf. e. g. *R. Brown* and the reviewer, Lond. Math. Soc. Lect. Note Ser. 48, 153-202 (1982; Zbl 0485.57001)], the authors of the paper under review give a modern version and a generalization of results of *A. M. Turing* [Compos. Math. 5, 357-367 (1938; Zbl 0018.39201)] (which rely on earlier results of Schreier and Reidemeister). In particular, they examine in detail the construction that results when the transcription of the usual 2-cocycle condition fails. This leads to a crossed sequence rather than to an ordinary group extension, and results on the classification of crossed sequences are given as well. The main result, Theorem 1.2, somewhat provides a framework for computations. In fact, the use of the crossed complex theory gives an easy access to finitary computations provided a suitable small free crossed resolution is available. This is illustrated with the standard presentation of the trefoil group G and with other examples.

Reviewer's remark: Related relevant references (which are not given) are the reviewer's two papers [J. Reine Angew. Math. 321, 150-172 (1981; Zbl 0441.20033) and J. Algebra 72, 296-334 (1981; Zbl 0462.18008)].

Reviewer: J.Huebschmann (Villeneuve d'Ascq)

MSC:

20E22	Extensions, wreath products, and other compositions of groups
20F05	Generators, relations, and presentations of groups
20J05	Homological methods in group theory
57M20	Two-dimensional complexes (manifolds) (MSC2010)
18G40	Spectral sequences, hypercohomology

Keywords:

crossed modules; identities among relations; group extensions with non-Abelian kernels; crossed sequences; crossed complexes; free crossed resolutions