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13850. *An introduction to the Bieri-Neumann-Strebel Invariant for finitely generated groups.*

For a finitely generated group  $G$ , the Bieri-Neumann-Strebel invariant is a topological invariant  $\Sigma^1(G)$  that provides a measure of “connectedness with respect to direction” in the Cayley graph. Among other applications,  $\Sigma^1(G)$  can be used to determine whether the kernel of a homomorphism from  $G$  to an abelian group is finitely generated. In their 1987 paper, Bieri, Neumann, and Strebel introduced the invariant, along with a compelling application in the form of the following theorem:

**Theorem.** *If a finitely presented group  $G$  has no nonabelian free subgroups and  $\text{rk}_{\mathbb{Z}}(G^{ab}) \geq 2$ , then there is a short exact sequence  $N \hookrightarrow G \twoheadrightarrow \mathbb{Z}$ , where  $N$  is finitely generated.*

I will introduce  $\Sigma^1$  and sketch the proof this theorem. (Received September 22, 2009)