

Morse-Novikov genus

Fabiola Manjarrez-Gutiérrez

UNAM

A classic theorem of knot theory is that every knot has a surface that fits into the 3-sphere so that it is orientable, connected, and whose boundary is the given knot. These surfaces are known as Seifert surfaces. They have been used to define the genus of the knot, among other invariants. They are also used to study the structure of the exterior of the knot. For example, a characteristic of fibered knots is that the fiber is the only Seifert surface that realizes the genus of the knot. Knots that are not fibered can also be studied through Seifert surfaces on their exteriors. In this case we can talk about the handle number of the knot exterior and the genus of the Seifert surface that realizes that number, called the Morse-Novikov genus. From the known examples there was evidence that the genus of the knot and the Morse-Novikov genus were the same. In collaboration with Ken Baker, we constructed examples of genus one such that their Morse-Novikov genus is at least two.

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