

Stable Homotopy Around the Arf-Kervaire Invariant



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This monograph describes important techniques of stable homotopy theory, both classical and brand new, applying them to the long-standing unsolved problem of the existence of framed manifolds with odd Arf-Kervaire invariant. Opening with an account of the necessary algebraic topology background, it proceeds in a quasi-historical manner to draw from the author's contributions over several decades. A new technique entitled the upper triangular technology is introduced which enables the author to relate Adams operations to Steenrod operations and thereby to recover most of the important classical Arf-Kervaire invariant results quite simply. The final chapter briefly relates the book to the contemporary motivic stable homotopy theory of Morel-Voevodsky. Excerpt from a review: This takes the reader on an unusual mathematical journey. The problem referred to in the title, its history and the author's relationship with it are lucidly described in the book. The book does not offer a solution, but a new and interesting way of looking at it. The stated purpose of the book is twofold: (1) To rescue the Kervaire invariant problem from oblivion. (2) To introduce the "upper triangular technology" to approach the problem. This is very useful, since this method is not widely known. It is not an introduction to stable homotopy theory but rather a guide for experts along a path to a prescribed destination. In taking us there it assembles material from widely varying sources and offers a perspective that is not available anywhere else. This is a case where the whole is much greater than the sum of its parts. The manuscript is extremely well written. The author's style is engaging and even humorous at times. (Douglas Ravenel)

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