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Uma homenagem a

Daciberg Lima Gonçalves em seus 60 anos

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Span of Projective Stiefel Manifolds

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In this talk some of the known results on the span of the real projective Stiefel manifolds $X_{n,r}$ will be summarized, and some recent improvements due to work of P. Sankaran, J. Korbaš, and the author will be presented. A wide variety of techniques have been applied to this problem, including vector bundles, characteristic classes, primary and secondary cohomology operations, K-theory, Cayley-Dickson algebras, normal bordism, etc, leading to sharp and even exact results in many cases. The case $X_{n,2}$ with n odd seems to be the most difficult, and it will receive special attention in the talk.

Monopole Floer homology and coupled homology

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The relationship between Coupled Homology and Monopole Homology will be sketched.

Let Y is be a closed n-manifold and H be a Hilbert space. Consider $f : Y \to R$ a Morse function and $\{T_y : H \to H \mid y \in Y\}$ a family of unbounded self-adjoint operators with discrete spectrum. Thus, the function

$$F : Y \times H \to R,\ F(y,T_y) = f(y) + \frac{< T_y\phi, \phi >}{\| \phi \|^2}.$$

is non-degenerated whenever the spectrum of T_y is simple and T_y is non-singular. The critical points of F are $y_{i\alpha} = (y_i, e_\alpha)$, where y_i is a critical point of f and e_α is an eigenvector of T_{y_i}. Besides, F induces a Morse function $\tilde{F} : Y \times CP^\infty \to R$. The homology associated to the Floer-Morse complex of $\tilde{F}$ is a general setting for the monopole homology group $\overline{HM}_*(Y,s)$, where Y is a closed 3-manifold endowed with a spin^c-structure s. It is also equivalent to a twisted cohomology theory $H^*_\xi(Y)$ associated to a closed 3-form $\xi \in H^3(Y,R)$. The class ξ enters to define the boundary operator, it corresponds to the pull-back by the map $Y \to U(H)$. For a 3-manifold Y, ξ is 3-dimensional.

References

[1] KRONHEIMER, P and MROWKA, T.; *Monopole and Three Manifolds*, New Math Monograph, 10, Cambridge Press, 2007.

[2] ATTIYAH, M. and SEGAL, G. - Twisted K-Theory, arXiv:math/0407054v2.