

Algebraic topology of and coassociative-free immersions into G_2 holonomy Riemannian 7-manifolds

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In this talk, we give a survey of various results about the topology of oriented Grassmannian bundles related to the exceptional Lie group G_2 . Some of these results are new. One often encounters these spaces when studying submanifolds of manifolds with calibrated geometries. As an application we deduce existence of certain special 3 and 4 dimensional submanifolds of G_2 holonomy Riemannian manifolds with special properties. These are called Harvey-Lawson(LH) pairs. Which appeared first in the work of Akbulut and Salur about G_2 dualities. Another application is to the coassociative-free embeddings. We show that if there is a coassociative-free embedding of a 4-manifold into the Euclidean 7-space then the signature vanishes along with the Euler characteristic. The converse of this theorem is proved in the more general sense by .nal using h-principle techniques. We will talk about this direction if time permits. Joint work with S.Akbulut and I.Ünal.