Department of Mathematics
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FELIX KLEIN SEMINAR

Guest Speaker: Fuquan Fang
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Date: Thursday, August 31, 2017

Time: 2:00 PM

Location: 258 Hurley Hall

Lecture Title:
Dual submanifolds in rational homology spheres

Abstract

Let Σ be a rational homology sphere. A pair of disjoint closed submanifolds $M_+, M_- \subset \Sigma$ are called *dual* to each other if the complements $\Sigma - M_+$ strongly homotopy retracts onto M_- or vice-versa. In this paper we are concerned with the basic problem of which integral triples $(n; m_+, m_-) \in \mathbb{N}^3$ can appear, where $n = \dim\Sigma - 1$, $m_\pm = \mathrm{codim} M_\pm - 1$. The problem is motivated by several fundamental aspects in differential geometry. Our main result provides a surprising simple answer, namely, if and only if one of the following holds true: $m_+ = m_- = n$, $m_+ = m_- = \frac{1}{3}n \in \{1, 2, 4, 8\}$, $m_+ = m_- = \frac{1}{6}n \in \{1, 2\}$, $\frac{n}{m_+ + m_-} \in \{1, 2\}$. Moreover, assuming $\frac{n}{m_+ + m_-} = 2$, if $m_+ = m_-$, then $m_+ = m_- \in \{1, 2\}$; if $m_+ > m_- \geq 2$, then $m_+ + m_-$ is odd.

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