
HADI SALMASIAN, University of Windsor, Windsor, ON
Structure and geometry of direct limit Lie algebras

Recently there has been growing interest in structure theory, representations, and geometric phenomena associated to locally finite Lie algebras, e.g., direct limits of classical and loop algebras. Remarkable examples include Borel–Weil–Bott theory and the structure of weight modules (studied by Dimitrov, Neeb, Penkov, Wolf, . . .).

In this talk I will begin by discussing suitable notions of Cartan and Borel subgroups/subalgebras in infinite dimensions. Next, I introduce certain B -modules associated to line bundles on B -stable ind-varieties in infinite Grassmannian. These B -modules are natural analogues of Demazure modules for classical direct limit ind-groups. I will state a theorem which connects the geometry of these B -stable varieties to finiteness of weight multiplicities of associated Demazure modules.

Finally, for the case of direct limits of loop algebras, I study conjugacy of maximal tori and their corresponding root systems. I state a theorem which answers this classification problem completely. Somewhat surprisingly, the theorem links conjugacy to classical K -theory.