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Geometry of multiplicity-free representations of GL(n), visible actions on flag varieties, and triunity. (English) Zbl 1050.22018

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Summary: We analyze the criterion of the multiplicity-free theorem of representations (1997, 2000 Kobayashi) and explain its generalization. The criterion is given by means of geometric conditions on an equivariant holomorphic vector bundle, namely the "visibility" of the action on a base space and the multiplicity-free property on a fiber. Then, several finite-dimensional examples are presented to illustrate the general multiplicity-free theorem, in particular, explaining that three multiplicity-free results stem readily from a single geometry in our framework. Furthermore, we prove that an elementary geometric result on Grassmann varieties and a small number of multiplicity-free results give rise to all the cases of multiplicity-free tensor product representations of GL($n, \mathbb{C}$) which Stembridge (2001) has recently classified by completely different and combinatorial methods.

Reviewer: A. A. Bogush (Minsk)

MSC:

22E46	Semisimple Lie groups and their representations
32A37	Other spaces of holomorphic functions of several complex variables (e.g., bounded mean oscillation (BMOA), vanishing mean oscillation (VMOA))
05E15	Combinatorial aspects of groups and algebras (MSC2010)
20G05	Representation theory for linear algebraic groups

Keywords:

multiplicity-free representation; branching law; semisimple Lie group; totally real; unitary representation; flag variety; tensor product; visible action

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