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Special 2-flags in lengths not exceeding four: a study in strong nilpotency of distributions

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In the recent years, a number of issues concerning distributions generating 1- flags (called also Goursat flags) has been analyzed. Presently similar questions are discussed as regards distributions generating multi-flags. (In fact, only so-called special multi-flags, to avoid functional moduli.) In particular and foremost, special 2-flags of small lengths are a natural ground for the search of generalizations of theorems established earlier for Goursat objects. In the present paper we locally classify, in both C{\omega} and C \infty categories, special 2-flags of lengths not exceeding four. We use for that the known facts about special multi-flags along with fairly recent notions like strong nilpotency of distributions. In length four there are already 34 orbits, the number to be confronted with only 14 singularity classes - basic invariant sets discovered in 2003. As a common denominator for different parts of the paper, there could serve the fact that only rarely multi-flags' germs are strongly nilpotent, whereas all of them are weakly nilpotent, or nilpotentizable (possessing a local nilpotent basis of sections).

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