Generic Submanifolds of Almost Contact Metric Manifolds

Cornelia Livia BEJAN[1], **Cem SAYAR**[2]

[1] "Gh. Asachi" Technical University,
"Al. Myller", University "Al. I. Cuza", Iasi, Romania.
[2] Florida International University, Miami, Florida
Istanbul Technical University, Istanbul, Turkey

Ronsse introduced the notion of generic and skew CR-submanifolds of almost Hermitian manifolds in order to unify and generalize the notions of holomorphic, totally real, CR, slant, semi-slant and pseudo-slant submanifolds. Other authors, such as Tripathi, extended this notion to contact geometry, under the name of almost semi-invariant submanifolds. This class includes the one with the same name introduced by Bejancu (and studied also by Tripathi), but without being equal. The class of submanifolds that we introduce and study here in contact geometry is called by us generic submanifolds, in order to avoid the above confusion, and also since it is different from the class studied by Tripathi, because in our paper, the Reeb vector field is not necessarily tangent to the submanifold. We obtain necessary and sufficient conditions for the integrability and parallelism of some eigen-distributions of a canonical structure on generic submanifolds. Some properties of the Reeb vector field to be Killing and its curves to be geodesics are investigated. Totally geodesic and mixed geodesic results on generic submanifolds are established. We give necessary and sufficient conditions for a generic submanifold to be written locally as a product of the leaves of some eigen-distributions. Some examples on both generic submanifolds and skew CR-submanifolds of almost contact metric manifolds are constructed.

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