Normal forms for nonintegrable almost CR structures

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Abstract: We give constructions extending the Chern-Moser normal forms to non-integrable Levi-nondegenerate (hypersurface type) almost CR structures. One of them translates the Chern-Moser normalization into pure intrinsic setting, whereas the other directly extends the (extrinsic) Chern-Moser normal form by allowing non-CR embeddings that are in some sense "maximally CR". One of the main differences with the classical integrable case is the presence of the non-integrability tensor at the same order as the Levi form, making impossible a good quadric approximation - a key tool in the Chern-Moser theory. Partial normal forms are obtained for general almost CR structures of any CR codimension, in particular, for almost-complex structures. Applications are given to the equivalence problem and the Lie group structure of the group of all CR-diffeomorphisms. These normal forms require an additional nondegeneracy condition called "strong nondegeneracy" involving the non-integrability tensor. In a further unified normal form we a able to remove that condition by modifying the normalization condition involving higher order terms than the ones used by Chern and Moser.