Complexifications of infinite-dimensional manifolds and new constructions of infinite-dimensional Lie groups

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We prove existence and uniqueness results for complexifications of infinite-dimensional real analytic manifolds. For each Banach-Lie group H over the real or complex field $\mathbb{K}$ and each non-empty compact subset K of a regular $\mathbb{K}$-analytic manifold M modeled on a metrizable locally convex space, this enables us to turn the group $\mathrm{Germ}(K, H)$ of all germs of H-valued $\mathbb{K}$-analytic maps on open neighbourhoods of K into a C^0-regular $\mathbb{K}$-analytic Lie group. In particular, $C^\omega(M, H)$ is a C^0-regular real analytic Lie group for each compact real analytic manifold M. Combining the results with a recent idea of Neeb and Wagemann, we also obtain a C^0-regular real analytic Lie group structure on $C^\omega(\mathbb{R}, H)$.