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Title: Preservers of numerical radius on Lie products of self-adjoint operators

Abstract: Let H be a complex Hilbert space with dim $H \geq 3$, $\mathcal{B}_s(H)$ the Lie algebra of all bounded self-adjoint operators on H, and let $F : B(H) \to [d, \infty]$ with $d \geq 0$ be a radial unitary similarity invariant function. A structure feature for maps ϕ on $\mathcal{B}_s(H)$ satisfying

$$F(\phi(A)\phi(B) - \phi(B)\phi(A)) = F(AB - BA) \quad (A, B \in \mathcal{B}_s(H))$$

is given. As an application of this result, a characterization of the maps on $\mathcal{B}_s(H)$ preserving the numerical radius, the maps preserving the p-norm, the maps preserving the pseudo spectral radius are obtained. Furthermore, complete classification of the maps on $\mathcal{B}_s(H)$ preserving the numerical range and the maps preserving the pseudo spectrum are also achieved.

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