Eigenvalues of generic adjoint maps in comtrans algebras of bilinear spaces

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Comtrans algebras are unital modules over a commutative ring R, equipped with two basic trilinear operations: a *commutator* $[x, y, z]$ satisfying the *left alternative identity*

$$[x, x, y] = 0,$$

and a *translator* $\langle x, y, z\rangle$ satisfying the *Jacobi identity*

$$\langle x, y, z\rangle + \langle y, z, x\rangle + \langle z, x, y\rangle = 0,$$

such that together the commutator and translator satisfy the *comtrans identity*

$$[x, y, x] = \langle x, y, x\rangle.$$

A long-term goal of the research effort devoted to comtrans algebras is to develop a general structure theory. As a first step towards this goal, we focus on the eigenvalues of generic adjoint maps of comtrans algebras $CT(E, \beta)$ of bilinear spaces (E, β), and the extent to which knowledge of these eigenvalues and their multiplicities serves to specify the algebras up to isomorphism within certain classes. Such a comtrans algebra $CT(E, \beta)$ has underlying module E and its algebra structure is defined by

$$[x, y, z] = y\beta(x, z) - x\beta(y, z)$$

and

$$\langle x, y, z\rangle = y\beta(z, x) - x\beta(y, z).$$