Logarithmic sheaves of complete intersections

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Abstract. We define logarithmic tangent sheaves associated with subvarieties of codimension larger than 1 in connection with Jacobian syzygies and distributions. We analyze the notions of local freeness, freeness, and stability of these sheaves.

We carry out a complete study of logarithmic sheaves associated with pencils of quadrics and compute their projective dimension from the classical invariants such as the Segre symbol and new invariants (splitting type and degree vector) designed for the classification of irregular pencils. This leads to a complete classification of free (equivalently, locally free) pencils of quadrics.

Finally, we produce examples of locally free, non-free pencils of surfaces in $\mathbb{P}^3$ of arbitrary degree $k \geq 3$, answering (in the negative) to a question of Calvo-Andrade, Cerveau, Giraldo, and Lins Neto about codimension-one foliations on $\mathbb{P}^3$.