Completely bounded norms of right module maps

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Let D_n denote the algebra of diagonal $n \times n$ matrices. If T is a a Schur multiplier on the $m \times n$ matrices $M_{m,n}$ (that is, T is a D_m–D_n bimodule map), then it is well-known that $\|T\|_{cb} = \|T\|$. Using Timoney's work on elementary operators, we show that if T is merely a right D_2-module map on $M_{m,2}$, then again we have $\|T\|_{cb} = \|T\|$. However,

$$C(m, n) = \sup \left\{ \frac{\|T\|_{cb}}{\|T\|} : T \text{ is a right } D_n\text{-module map on } M_{m,n} \right\}$$

grows with m, n. Hence there is a bounded right ℓ^∞-module map on $B(\ell 2)$ which is not completely bounded, answering a question posed in a recent paper of Juschenko, the speaker, Todorov and Turowska.

This is joint work with R. Timoney.