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**J. Alejandro Chavez Dominguez\***, Department of Mathematics, Mailstop 3368, Texas A&M University, College Station, TX 77843-3368. *Duality for Lipschitz  $p$ -summing operators.*

Building upon the ideas of R. Arens and J. Eells we introduce the concept of spaces of Banach-space-valued molecules, whose duals can be naturally identified with spaces of operators between a metric space and a Banach space. On these spaces we define analogues of the tensor norms of S. Chevet and P. Saphar, whose duals are spaces of Lipschitz  $p$ -summing operators. In particular, we identify the dual of the space of Lipschitz  $p$ -summing operators from a finite metric space to a Banach space — answering a question of J. Farmer and W. B. Johnson — and use it to give a new characterization of the non-linear concept of Lipschitz  $p$ -summing operator between metric spaces in terms of linear operators between certain Banach spaces. (Received September 14, 2010)