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**Stephen J Young\***, stephen.young@pnnl.gov. *Ramanujan Graphs and Supercomputing Topologies*. Preliminary report.

In modern supercomputing systems a significant fraction of the overall computation time is dedicated to interprocess communication. As a consequence, significant amount of hardware and algorithmic resources are devoted to decreasing the impact of communication congestion on process runtime. In this work we evaluate the potential applicability of Ramanujan graphs to design supercomputing topologies which are more robust to communication congestion. We specifically consider the ability of supercomputing topologies inspired by the explicit Ramanujan graph constructions given by Margulis as well as Lubotzky, Phillips, and Sarnak, to minimizing the communications overhead of supercomputing topologies. Joint work with Sinan Aksoy, Kevin Barker, Paul Bruillard, Tobias Hagge, Mark Kempton, Joseph Manzano, Carlos Ortiz Marrero, Mark Raugas, and Joshua Suetterlein. (Received September 13, 2020)