Abstract Submitted
for the APR11 Meeting of
The American Physical Society

Gauge, Averaging, Parity, and Modesum Regularization in Gravitational Self-force SAMUEL GRALLA, University of Chicago — Previous treatments of gravitational self-force have relied on Lorenz-gauge Hadamard techniques (involving lengthy calculations) for both the derivation and the expression of the final result. I give a short derivation that nowhere involves the Lorenz gauge and that leads to an angle-average formula for the self-force that holds in any admissible gauge. For gauges that satisfy a parity condition given by Regge and Teitelboim to ensure that their Hamiltonian center of mass is well-defined, the result simplifies to a simple average of the bare force. Remarkably, the parity condition also allows one to show that all such gauges share the same "mode sum regularization parameters". Since both the Lorenz gauge and a radiation gauge of Kerr (Keidl,Shah,Friedman,Kim,Price) satisfy the parity condition, existing Lorenz-gauge mode sum regularization results may be employed in radiation gauge calculations.

Samuel Gralla
University of Chicago

Date submitted: 13 Jan 2011 Electronic form version 1.4