Abstract Submitted
for the DPP14 Meeting of
The American Physical Society

Unifying the Parker and the Turbulence Models of Solar Coronal Heating[1] C.S. NG, T.J. DENNIS, University of Alaska Fairbanks — We present results from a series of three-dimensional simulations investigating heating in coronal loops of various lengths, based on the equations of reduced magnetohydrodynamics, following up on our recent simulations of the Parker model of coronal heating [Ng et al., Astrophys. J. **747** 109, 2012]. We study the time-averaged energy dissipation rate $\langle W \rangle$ as a function of the length of the loop L. We confirm that in the limit of small L ($L \ll V_A \tau_c$, where V_A is the Alfvén speed based on the parallel magnetic field and τ_c is the correlation time of the random photospheric motions), $\langle W \rangle$ agrees well with the scaling derived from the Parker model. In the other limit of $L \gg V_A \tau_c$, we show that $\langle W \rangle$ is given by the photospheric Poynting flux required to launch Alfvén waves. In the intermediate range of $L \sim V_A \tau_c$, $\langle W \rangle$ is well described by a scaling based on the Kolmogorov turbulence energy cascade, rather than the Iroshnikov-Kraichnan cascade. We also show that $\langle W \rangle$ can be modeled by combining the Parker heating and the Alfvén wave launching power for all range of L.

[1]This work is supported by a National Science Foundation grant AGS-0962477.

Chung-Sang Ng
University of Alaska Fairbanks

Date submitted: 10 Jul 2014 Electronic form version 1.4