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Scaling of Global LHCD Efficiency in Alcator C-Mod[1] S. SCOTT, PPPL, P. BONOLI, R. MUMGAARD, S. SHIRAIWA, G. WALLACE, D. WHYTE, MIT/PSFC — A database of global current-drive efficiency by Lower Hybrid waves has been assembled covering nine years of C-Mod operation. Plasma conditions were averaged over 50-ms time slices during equilibrated current-profile time periods, excluding transient events such as Prad spikes. The database comprises 1800 time slices spanning: $PLH < 1.1$ MW, $n_{||}$ =1.5-2.3, Ip = 0.3-1.0 MA, nebar = 0.35-1.5e20. Nine percent of the data points are approximately non-inductive ($\Delta V/V > 0.9$), while 17 percent experience low m,n MHD that degrades the LHCD efficiency. During LHCD, a simple Spitzer model is used to estimate the residual inductively-driven current which scales the pre-LH current by the ratio of the loop voltage to the pre-LH loop voltage, correcting also for the change in conductivity. The current-drive efficiency is defined as η = nebar R I_{LHCD}/P_{LH} [10^{20} MA/m^2 MW], where I_{LHCD} is the current driven by LH waves and P_{LH} is the forward-directed LH power. In approximately non-inductive, MHD-free plasmas, the global current drive efficiency shows a striking positive correlation with plasma current, η = 0.065 + 0.40 x Ip [MA], reaching a value of η =0.47 at Ip=1.02 MA. A positive but weaker correlation between η and Teo does not explain the η dependence on Ip. Preliminary GENRAY/CQL3D simulations at Ip=1.0 MA predict 900 kA of driven current versus 1000 kA observed. Comparisons of η to numerical simulations over a wide parameter range will be discussed.

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