1135-65-1778 **Cu Hauw Hung*** (cuhauw.hung@biola.edu), 13800 BIola Ave, La Mirada, CA 90639, and **Yue Yi Li** (yli5@macalester.edu), 1600 Grand Ave, St. Paul, MN 55105. *Improving the efficiency of Adaptive (Quasi-) Monte Carlo Methods using (Internal) Control Variates.* Preliminary report.

(Quasi-)Monte Carlo ((Q)MC) simulations are used to compute the means of random variables whose distributions are too complex to admit analytic formulae. This work builds upon the automatic stopping criteria developed for (Q)MC simulations that use theoretically justified, data-based error bounds to determine when the error tolerance has been met. This research extends these automatic (Q)MC algorithms to include control variates and internal control variates. Control variates reduce variance and thus improve computational efficiency. Internal control variates could further deal with situations where multiples random variables share the same expected value. The stopping criteria must be modified, and the choice of control variate coefficients for QMC must be made differently than for simple MC. Numerical tests of our new algorithms and stopping criteria demonstrate that the error tolerance continues to be and that the computational effort required can be dramatically reduced. (Received September 24, 2017)