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**Ugur G. Abdulla\*** (abdulla@fit.edu), Department of Mathematical Sciences, Florida Institute of Technology, 150 West University Blvd, Melbourne, FL 32901. *Wiener's Criterion at  $\infty$  for the Heat Equation and its Measure-theoretical Counterpart.*

We introduce a notion of regularity (or irregularity) of the point at infinity ( $\infty$ ) for the unbounded open set  $\Omega \subset R^{N+1}$  concerning the heat equation, according as whether the parabolic measure of  $\infty$  is zero (or positive). A necessary and sufficient condition for the existence of a unique bounded solution to the parabolic Dirichlet problem in arbitrary unbounded open subset of  $R^{N+1}$  is established. It is expressed in terms of the Wiener's criterion for the regularity of  $\infty$ . A geometric iterated logarithm test for the well-posedness of the parabolic Dirichlet problem in arbitrary open subset of  $R^{N+1}$  ( $N \geq 2$ ) is proved. A domain is produced for which the parabolic Dirichlet problem always has a unique bounded solution for the heat equation  $u_t = \Delta u$ , and infinitely many for the equation  $u_t = (1 - \epsilon)\Delta u$  for all  $0 < \epsilon < 1$ . We also demonstrate parabolic "exterior cone" condition at  $\infty$ . (Received August 24, 2007)