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Yuri A. Melnikov* (ymelniko@mtsu.edu), Department of Mathematical Sciences, Middle Tennessee State University, Murfreesboro, TN 37132. *An unlooked-for outcome from a standard procedure for the construction of Green's functions for Laplace equation.* Preliminary report.

An innovative technique is developed for obtaining new infinite product representations of some elementary functions. The technique is based on the comparison of alternative expressions of Green's functions for the two-dimensional Laplace equation that are obtained by two different methods. Some standard boundary value problems are considered posed on regions of regular configuration. Classical closed analytic form of Green's functions for such problems are compared against those obtained by the method of images. This approach brings a number of new infinite product expansions for some trigonometric and hyperbolic functions. The issue of convergence is discussed and graphical illustrations are presented. (Received July 19, 2007)