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A novel boundary closure treatment for the wavelet based multiresolution time-domain (MRTD) solution of Maxwell's equations will be introduced. The novel scheme is able to accommodate non-trivial boundary conditions such as the Robin condition or time dependent condition in MRTD analysis of wave scattering, radiation, and propagation problems. A matched interface and boundary (MIB) method is adopted for boundary extensions when computational values are required outside standard domain. A systematic procedure is proposed to update the time in the MRTD calculations by using a novel Runge-Kutta schemes so that an arbitrarily high order of convergence in both space and time could be realized. The proposed boundary treatment can also be applied to other high order finite-difference time-domain(FDTD) approaches, such as the dispersion-relation-preserving(DRP) method, in order to handle more complicated electromagnetic structures. (Received August 13, 2010)