

This report is organized as follows: In Chapter 2, the relevant FDTD algorithm is summarized, along with its extensions for various well-logging scenarios. In Chapter 3, numerical simulation results for various logging tools are presented. We first discuss results from MWD tools in eccentric boreholes, where the effect of eccentricity on the tool response (i.e., phase difference and amplitude ratio) is briefly analyzed. This is followed by a description of results for an array induction tool in horizontal formations that include both circular and non-circular invasion zones. Next, induction resistivity tools are considered, where FDTD simulation results is compared against results from the numerical mode matching (NMM) method. At last, results for directional resistivity tools (DRTs), having tilted coil transmitter and receiver antennas, are presented. In this case, the FDTD results in homogeneous formations (but including the tool mandrel) are compared against a pseudo-analytic formulation especially developed for this problem. In Chapter 4, directions of future work are outlined. The directions for possible future work are chosen here towards further improvement of flexibility, increase on accuracy, and reduction of computational cost (CPU time).