THE SUBMILLIMETER SPECTRUM OF MnH AND MnD ($X^7\Sigma^+$)

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The $N = 0 \rightarrow 1$ transition of MnH and the $N = 2 \rightarrow 3$ transition of MnD in their $^7\Sigma^+$ ground states have been measured at submillimeter wavelengths from 333 to 517 GHz. The spectra of these molecules were recorded using millimeter-wave direct absorption methods. MnH and MnD were created in the gas phase from manganese vapor, produced with a Broida oven, and H_2 or D_2 in the presence of a DC discharge. Production of these radicals was somewhat problematic, and required extreme heating of the manganese. Fine structure and manganese hyperfine splittings were resolved for both radicals, as well as the hydrogen hyperfine structure for MnH. These spectra are the first pure rotational measurements recorded for these species. The data has been analyzed, and rotation, fine structure, and nuclear hyperfine parameters have been determined. These constants are in reasonable agreement with the past optical and infrared data.