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Title:Measurements and simulations of wave propagation for wireless sensor networks in jet engine turbines
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Abstract:In this letter, measurements and simulations of wave propagation inside a jet engine fan have been performed. The investigation was done using both EM simulations of different cases of propagation inside the engine and by measuring the corresponding cases inside a half-scale model of a jet engine fan. The average path loss was calculated, and the shapes of the fading distributions were extracted. The time between two consecutive fading dips was measured in the empirical part. Measurements were performed with engine speeds of both 30 and 60 rpm and were shown to be linearly scalable from 60 rpm to full speed of 10 000 rpm. The results showed an average path loss of about 55 dB. When scaling the measurements from 60 rpm to full-speed rotation of about 10 000 rpm, the fading was so severe that the time slot between consecutive fading dips was limited to 290 us.
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