

Comparisons of Error Characteristics between TOA and TDOA in Presence of Range Bias Errors

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ABSTRACT

Time-based methods including TOA and TDOA are commonly used in many radio-navigation systems. From the literature, it is known that the position estimate of TDOA obtained by GN method is exactly the same as that of TOA when the error source of the range measurement is only a white Gaussian noise. In case of geo-location and indoor positioning, however, multi-path or NLOS error is frequently appeared in range measurements. Though its occurrence is random, it acts like a bias for stationary users if it occurs. This paper presents comparisons of error characteristics between TOA and TDOA positioning in presence of range bias errors. It is analytically shown that the position estimate of TDOA is exactly the same as that of TOA even when bias errors are included in range measurements with different magnitudes. By computer simulation, position estimation error and divergence of GN method are analyzed in presence of range bias errors.

INTRODUCTION

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SIMULATION RESULTS

CONCLUSIONS

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