Abstract

Let C be an [n, k] linear code over the finite field Fq. Let $d_I(C)$ denote its insertion-deletion (insdel for short) distance, which characterizes the insdel error-correcting capability of C. In this paper we propose a strict half-Singleton upper bound $d_I(C) \leqslant 2(n-2k+1)$ if C does not contain the codeword with all 1s, which generalizes the half-Singleton bound on the insdel distances of linear codes due to Cheng-Guruswami-Haeupler-Li, and a stronger direct upper bound $d_I(C) \leqslant 2(d_H(C)-t)$ under a weak condition, where $t \geqslant 1$ is a positive integer determined by the generator matrix and $d_H(C)$ denotes the Hamming distance of C. A sufficient condition for a linear code attaining the strict half-Singleton bound is given. We prove that the code length of an optimal binary linear insdel code with respect to the (strict) half-Singleton bound is about twice its dimension and conjecture that optimal binary linear insdel codes have exact parameters [2k, k, 4] or [2k+1, k, 4] with respect to the half- or strict half-Singleton bound, respectively.