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On the existence of the best discrete approximation in $l_p$ norm by reciprocals of real polynomials

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**Abstract.** For the given data $(w_i, x_i, y_i)$, $i = 1, \ldots, M$, we consider the problem of existence of the best discrete approximation in $l_p$ norm ($1 \leq p < \infty$) by reciprocals of real polynomials. For this problem, the existence of best approximations is not always guaranteed. In this paper, we give a condition on data which is necessary and sufficient for the existence of the best approximation in $l_p$ norm. This condition is theoretical in nature. We apply it to obtain several other existence theorems very useful in practice. Some illustrative examples are also included.