

## A New Conjugate Gradient Method with Guaranteed Descent

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**Abstract :** Conjugate gradient methods are an important class of methods for unconstrained optimization, especially for large-scale problems. Recently, they have been much studied. In this paper, we propose a new two-parameter family of conjugate gradient methods for unconstrained optimization. The two-parameter family of methods not only includes the already existing three practical nonlinear conjugate gradient methods, but also has other family of conjugate gradient methods as subfamily. The two-parameter family of methods with the Wolfe line search is shown to ensure the descent property of each search direction. Some general convergence results are also established for the two-parameter family of methods. The numerical results show that this method is efficient for the given test problems. In addition, the methods related to this family are uniformly discussed.

**Keywords :** unconstrained optimization, conjugate gradient method, line search, global convergence

**Conference Title :** ICSRD 2020 : International Conference on Scientific Research and Development

**Conference Location :** Chicago, United States

**Conference Dates :** December 12-13, 2020