Dynamics of a family of third–order iterative methods that do not require using second derivatives

The purpose of this article is to present results that amount to a description of the conjugacy classes of three third–order root–finding iterative methods that do not require the use of second derivatives for their formulation, for complex polynomials of degrees two, three and four. For degrees two and three, a full description of the conjugacy classes is accomplished, in each case, by a one–parameter family of polynomials. This is done in such a way that, when one applies one of these three root–finding iterative methods to the elements of these parametrized families, a family of iterative methods is obtained, in such a way that its dynamics represents, up to conjugacy, the dynamics of the corresponding iterative root–finding method applied to any complex polynomial having the same degree. For degree four, analogous partial results are obtained.

Key Words. Iterative methods, dynamics, rational maps, conjugacy classes.

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