## "Look-Ahead" Linear Multistep Methods for ODEs

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We are concerned with numerical solutions of the initial-value problem of ordinary differential equations (ODEs):

$$\frac{\mathrm{d}y}{\mathrm{d}x} = f(x, y) \quad (a \le x \le b), \quad y(a) = y_I.$$

In the talk, we will propose a new class of linear multistep methods which has a potential of wide applications. The basic idea is as follows. Suppose we are now at a certain step-point x and an approximation  $y_0$  to y(x) is available. With the constant stepsize h, usually we try to obtain the approximation  $y_1$ of the next step-point x + h. Here, introducing a scheme for  $y_2$  at x + 2h by employing  $y_0$  and  $y_1$ , we compute it. The value  $y_2$  stands for a "look-ahead". Then, by another scheme incorporating  $y_0, y_1$  and  $y_2$ , we correct the value  $y_1$ .

These methods were proposed in the 80ies, but, as a matter of fact, ancestors can be found in the literature before. We will try to survey the preceding works and to study the methods both theoretically and practically.