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Kristyn N. McLeod* (knmcleod@asu.edu) and **Rodrigo Platte**. *FOURFUN: a new system for automatic computations using Fourier expansions*. Preliminary report.

Using object-oriented programming in MATLAB, a collection of functions, named Fourfun, has been created to allow for quick and accurate approximations of periodic functions with Fourier expansions. To increase efficiency and reduce the number of computations of the Fourier transform, Fourfun automatically determines the number of modes necessary for representations that are accurate close to machine precision. Common MATLAB functions have been overloaded to keep the syntax of the Fourfun class as consistent as possible with the general MATLAB syntax. We show that the system can be used efficiently to solve several differential equations. Comparisons with other systems, such as Chebfun, which is based on polynomial approximations, are provided. (Received September 17, 2013)