Time splitting methods for the compressible Euler equation using peer methods

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A new time-splitting method for the integration of elastic equations is presented. It is based on a three-step peer method which is a general linear method with second-order accuracy in every stage. The scheme uses a computationally very efficient forward-backward scheme for the integration of the high-frequency acoustic modes. With this splitting ansatz it is possible to integrate stably elastic equations without any damping. The peer method is tested with the dry Euler equations and a comparison with the common split-explicit second-order three-stage Runge-Kutta method by Wicker and Skamarock shows the potential of the class of peer methods with respect to computational efficiency, stability and accuracy. Different density based formulations of the Euler equation are compared within this splitting ansatz.