The Atomic Solution to the Euler Equation in Fractional Derivative

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Abstract

The Euler equation, which was first introduced by Euler in 1757, was studied by many mathematicians and physicists. It is considered one of the most fundamental Partial Differential Equations (PDEs) that can be taken place within many areas in applied mathematics and computation, like fluid mechanics, traffic flow, gas dynamics and many others. It was explored and discussed by a lot of researchers with the help of different numerical methods. Herein, for the reason that the method of separation of variables does not sometimes work well in solving the equation whenever it is nonlinear, we aim in this work to introduce an atomic solution for Euler equation in its conformable fractional derivative form. This would be performed using the tensor product technique with some of its properties. Some illustrative examples will be provided to verify our findings.