Optimal second-order diagonally implicit SSP Runge–Kutta methods

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Optimal Strong Stability Preserving (SSP) Runge–Kutta methods have been widely investigated in the last decade and many open conjectures have been formulated. The iterated implicit midpoint rule has been observed numerically optimal in large classes of second-order methods, and was proven to be optimal for some small cases, but no general proof was known so far to show its optimality. In this talk we show a new approach to analytically investigate this problem and determine the unique optimal methods in the class of second order diagonally implicit Runge–Kutta methods.