

Adomian Decomposition Method Combined with Padé Approximation for Solving African Swine Fever Virus Transmission among Swine Farms

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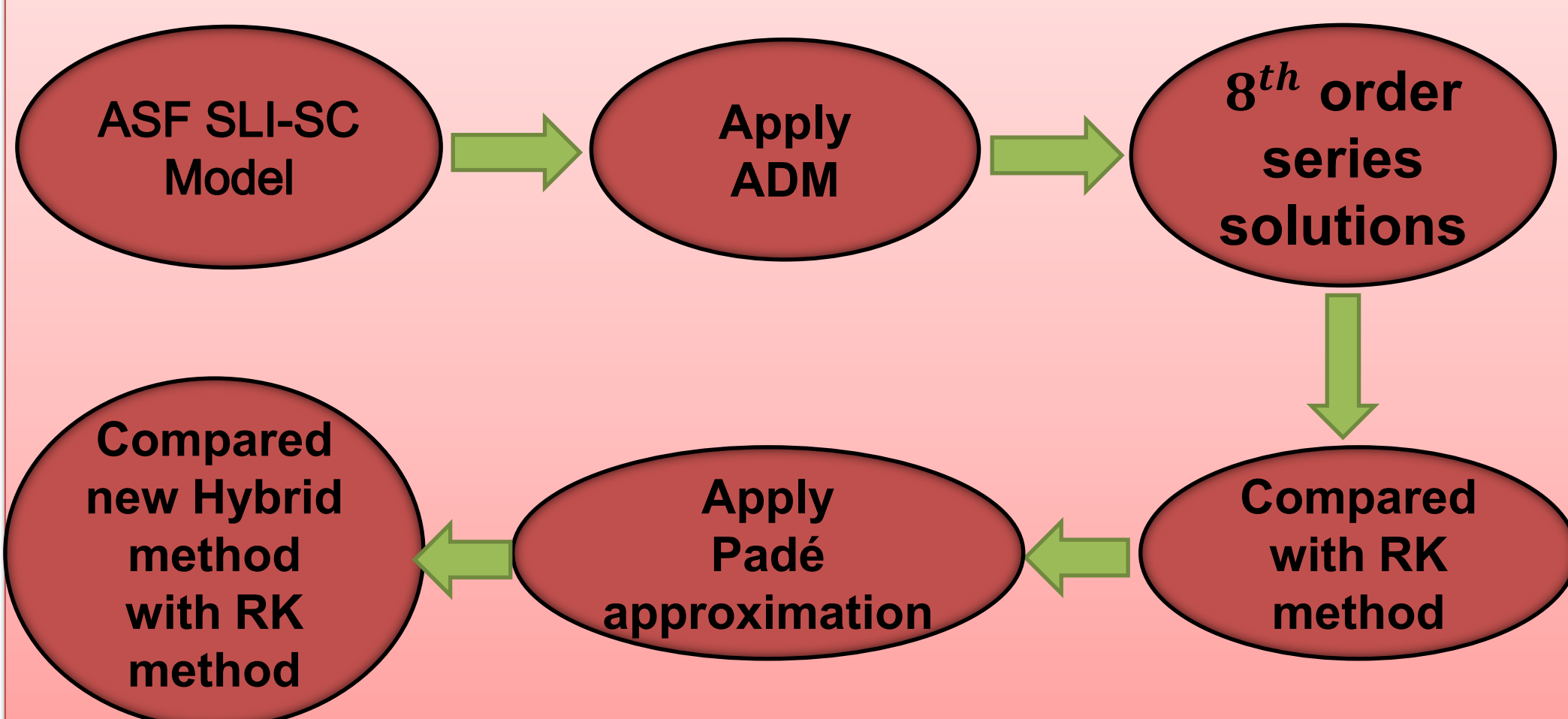
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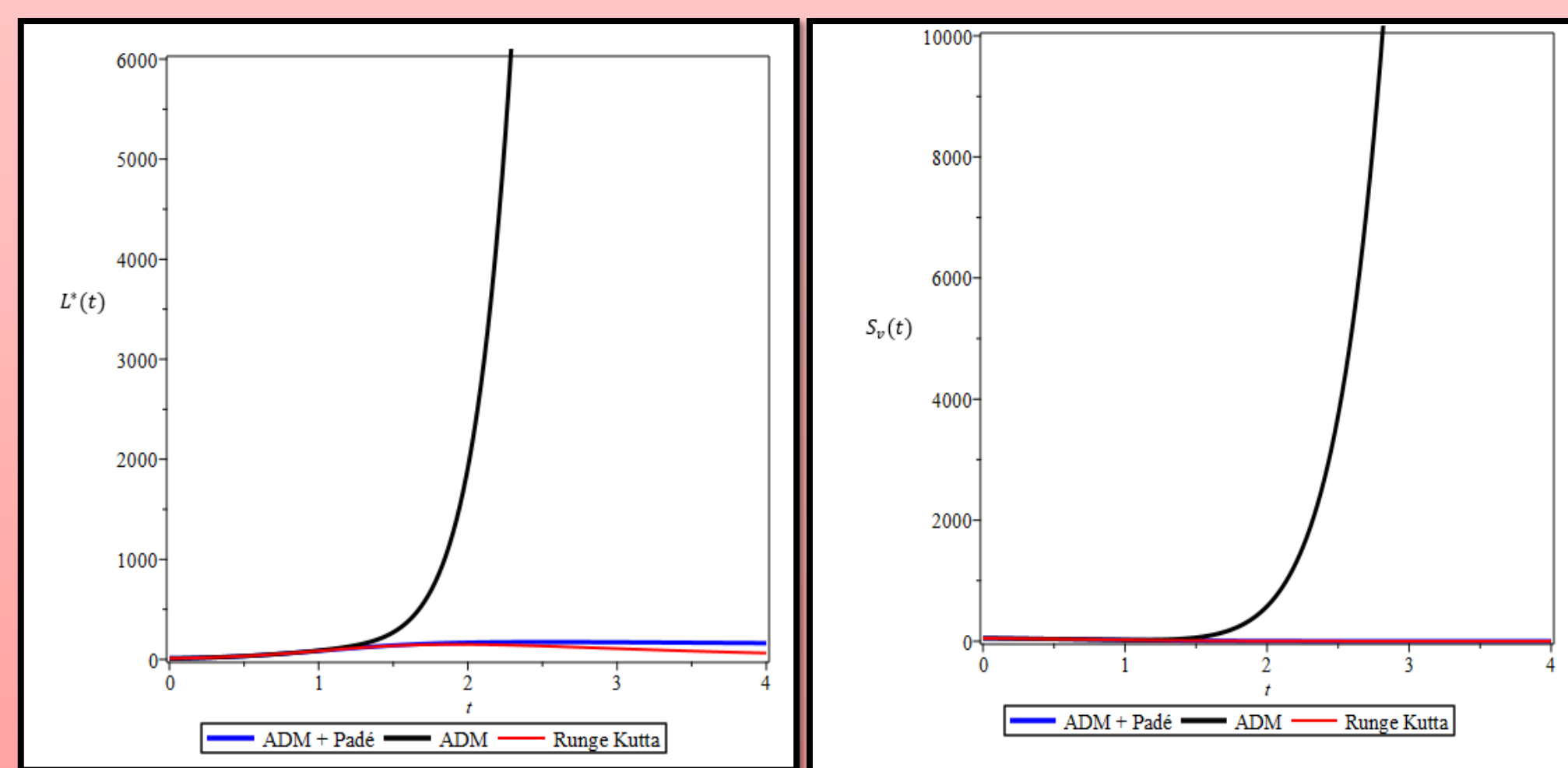
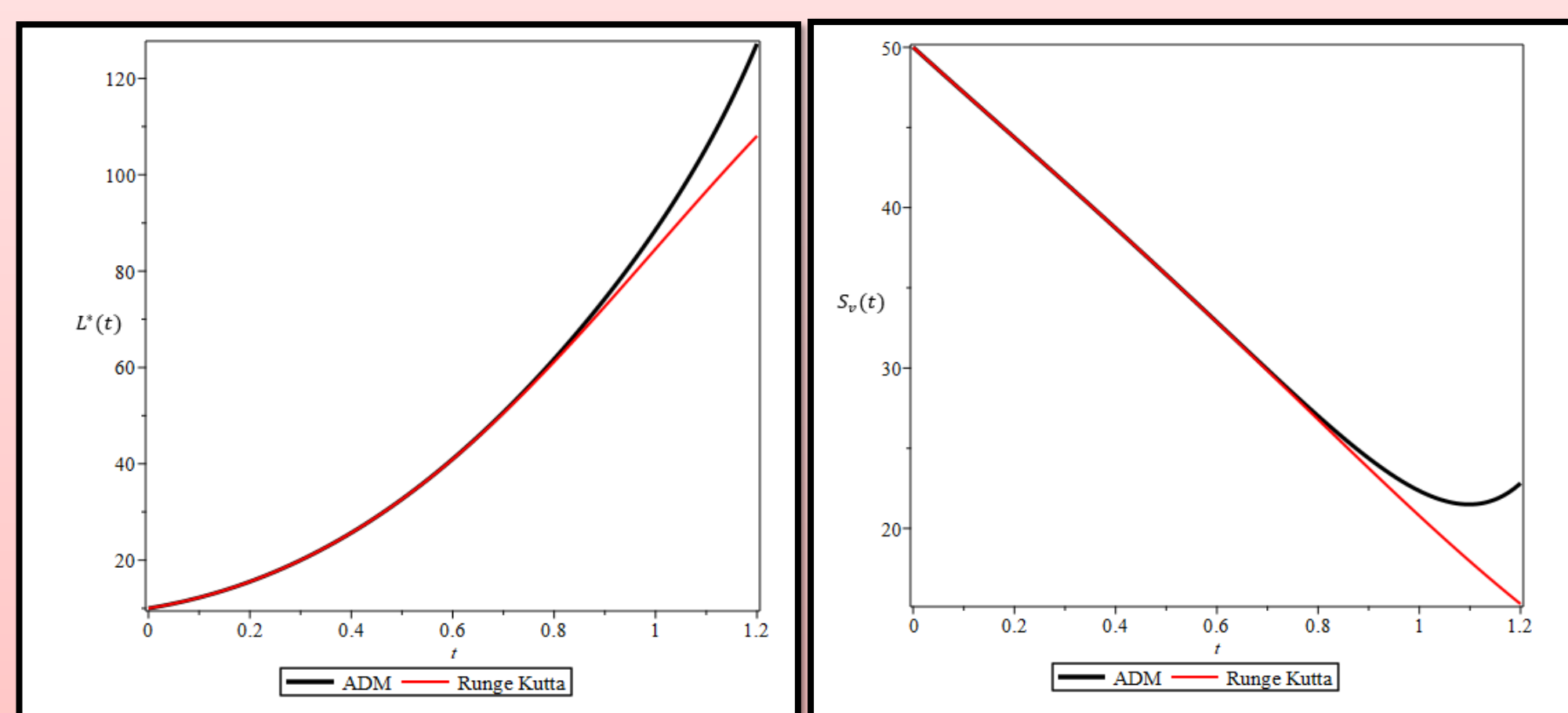
AIM

- To investigate the effectiveness of the Padé approximation method in improving the accuracy of analytical solutions for the transmission dynamics of African Swine Fever (ASF) virus using the SLI–SC mathematical model proposed by Chuchard et al. (2022), incorporating the role of human-contaminated vectors.

Methodology



RESULTS & DISCUSSION



RESULTS & DISCUSSION

- Analytical solutions were obtained using the classical Adomian Decomposition Method (ADM).
- Classical ADM and RKF45 solutions showed similar behavior only near the initial condition.
- To improve convergence and accuracy, ADM was combined with Padé approximations of orders [4,4] and [3,5].
- The ADM–Padé solutions showed close agreement with the RKF45 numerical solutions over a wider interval.

CONCLUSION

The hybrid classical ADM with Padé approximation provided accurate and rapidly convergent solutions for the African Swine Fever virus transmission model. The obtained solutions showed close agreement with the RKF45 numerical solutions. To the best of our knowledge, this is the first study to apply the hybrid ADM–Padé approach to this mathematical model.

REFERENCES

Chuchard P, Prathumwan D, Trachoo K, Maiaugree W, Chaiya I. 2022. The SLI-SC Mathematical Model of African Swine Fever Transmission among Swine Farms: The Effect of Contaminated Human Vector. *Axioms*. 11(7): 329.