



# Analytical Expansions for Parabolic Equations

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## Abstract

We consider the Cauchy problem associated with a general parabolic partial differential equation in  $d$  dimensions. We find a family of closed-form asymptotic approximations for the unique classical solution of this equation as well as rigorous short-time error estimates. Using a boot-strapping technique, we also provide convergence results for arbitrarily large time intervals.

## Keywords

[parabolic PDE](#)[asymptotic expansion](#)[singular perturbation](#)[analytical approximation](#)

## MSC codes

[35K10](#)[74G10](#)[91G20](#)

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