

**Asymptotic expansions about infinity  
for solutions of nonlinear differential equations  
with coherently decaying forcing functions**

LUAN HOANG

**Abstract.** This paper studies, in fine details, the long-time asymptotic behavior of decaying solutions of a general class of dissipative systems of nonlinear differential equations in complex Euclidean spaces. The forcing functions decay, as time tends to infinity, in a coherent way expressed by combinations of the exponential, power, logarithmic and iterated logarithmic functions. The decay may contain sinusoidal oscillations not only in time but also in the logarithm and iterated logarithm of time. It is proved that the decaying solutions admit corresponding asymptotic expansions, which can be constructed concretely. In the case of the real Euclidean spaces, the real-valued decaying solutions are proved to admit real-valued asymptotic expansions. Our results unite and extend the theory investigated in many previous works.

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