

# Hille Series Trajectory Tracing

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## Introduction

The Hille series is equivalent to a discretized Taylor series under the limit

$$\lim_{\Delta t \rightarrow 0} \sum_{n=0}^{\infty} \frac{t^n}{n!(\Delta t)^n} D^n f(a) = f(a+t)$$

for  $t > 0$  and  $D^n$  is the finite difference operator of order  $n$ .

For a discrete time step  $\Delta t$ , the trajectory  $f$  can be predicted at future times  $a+t$ . The number of historical trajectory points needed depends on the order of the approximation. When expanded, this equation yields:

$$\left[ 1 + \frac{t}{\Delta t} D^1 + \frac{t^2}{2(\Delta t)^2} + \dots \right] f(a)$$

## Version Info

```
git clone git@github.com:hasselmonians/hasselmo-tracking.git /home/ahoyland/code/hasselmo-tracking
git checkout e3b2032ad7674b6e05cc7afe732e982641b5c617
git clone git@github.com:alec-hoyland/srinivas.gs_mtools.git /home/ahoyland/code/srinivas.gs_mtools
git checkout c21986bb074dadb0258f494f6e0a024d05f21714
```

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