WS-B
PS-B8

Numerical simulation of spin-motive force in antiferromagnetic correlation

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A. Okabayashi and T. Morinari, arXiv:1411.1589

· Spintronics

Ferromagnets

Conduction electron's spin : ↑

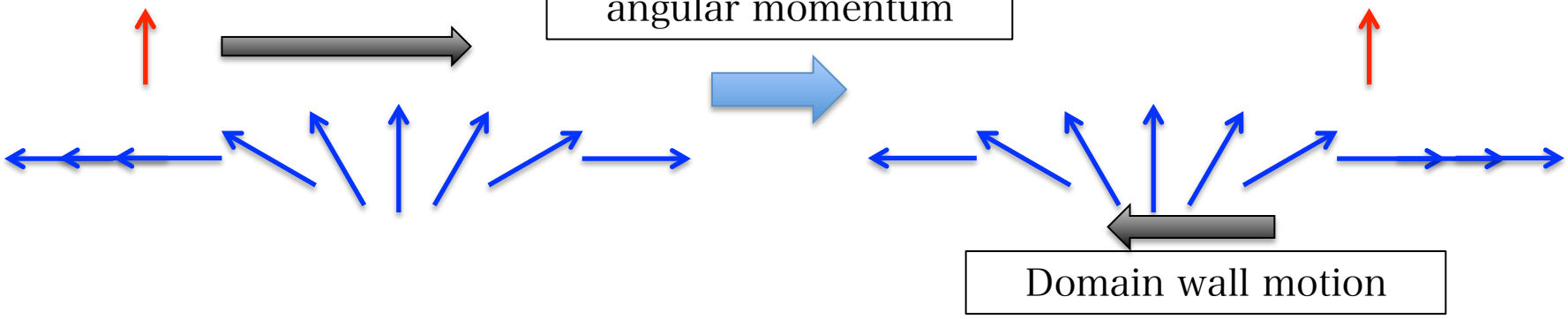
Localized spin : ↑

1. Operating magnetization → Spin-transfer torque

[1] D. Ralpha and M. Stiles (2008)

Spin currents enter domain wall

Conservation of spin angular momentum



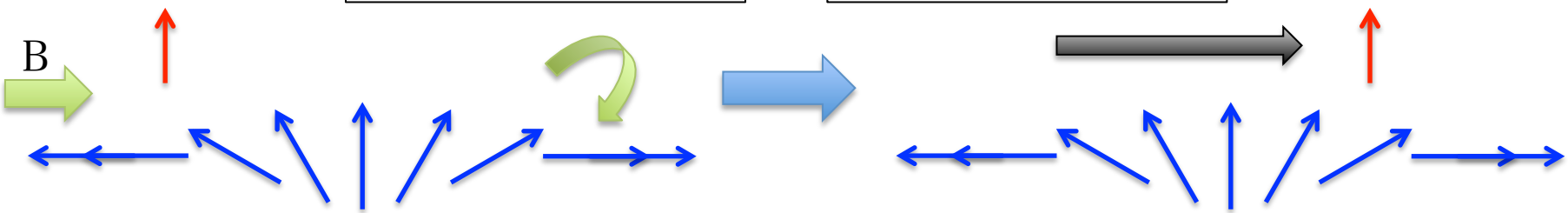
Domain wall motion

2. Creating spin currents → Spin-motive force

[2] S. E. Barnes and S. Maekawa (2007)

Leads Berry phase

Feels motive force



Precession of localized spins by magnetic field B

Spin currents is created

· Spintronics

Antiferromagnets

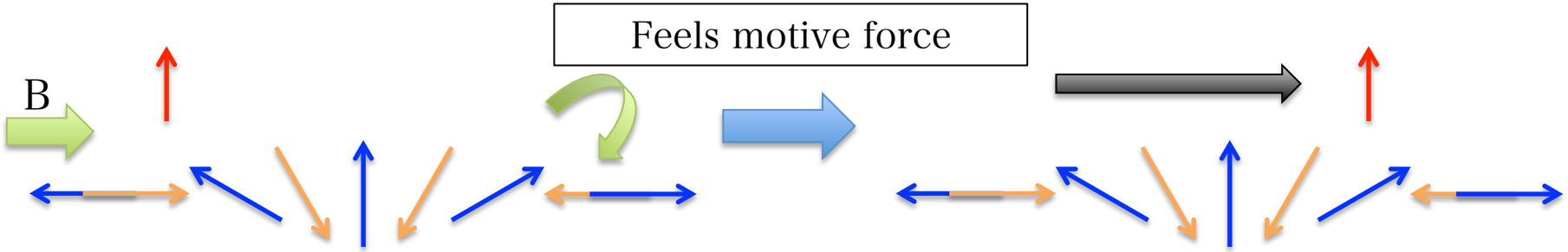
Conduction electron's spin : ↑

Localized spin : ↑ ↓

3. Spin-motive force in antiferromagnets

In week coupling limit

[3] R. Cheng and Q. Niu (2012)



· In this research

(A. Okabayashi and T. Morinari, arXiv:1411.1589)

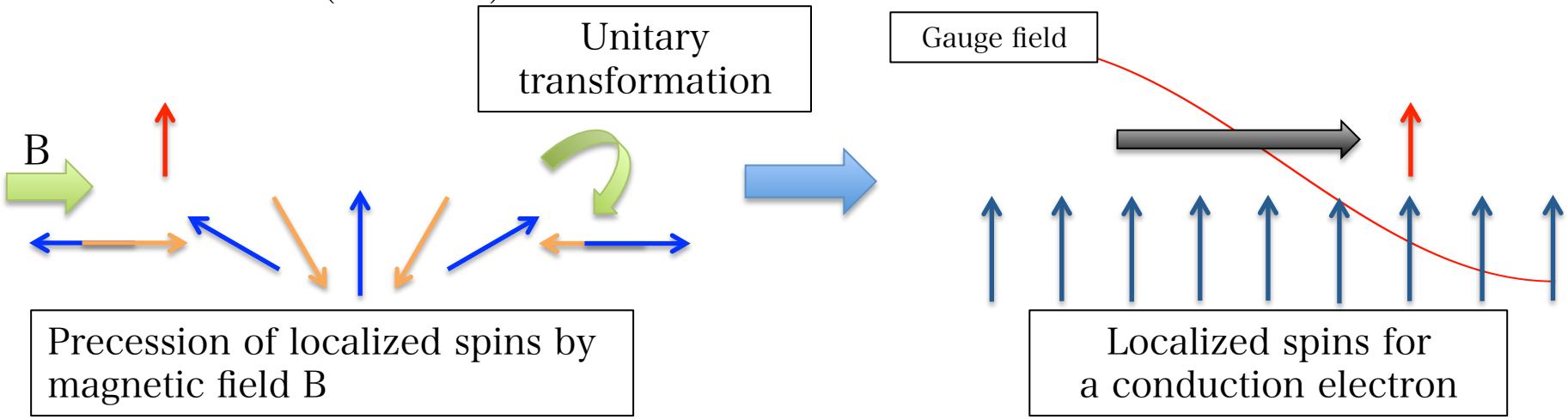
1. Assume strong coupling limit

$$i\sigma_y = \begin{pmatrix} 0 & 1 \\ -1 & 0 \end{pmatrix}$$

2. Using unitary transformation

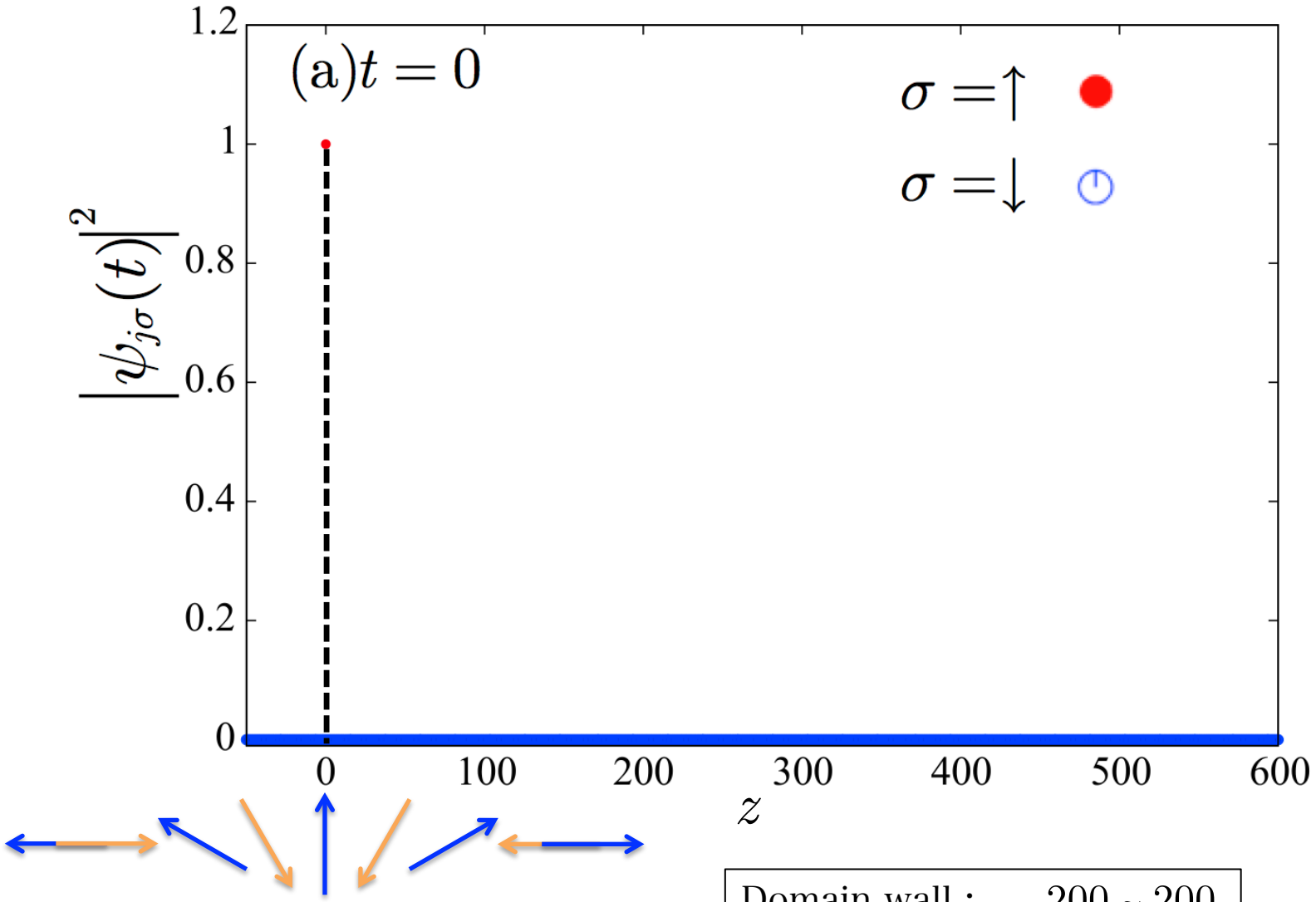
Decide unitary matrix to be diagonal s-d interaction

$$U_j^{\dagger}(\mathbf{S}_j \cdot \sigma)U_j = S\sigma_z$$



· Numerically simulation result

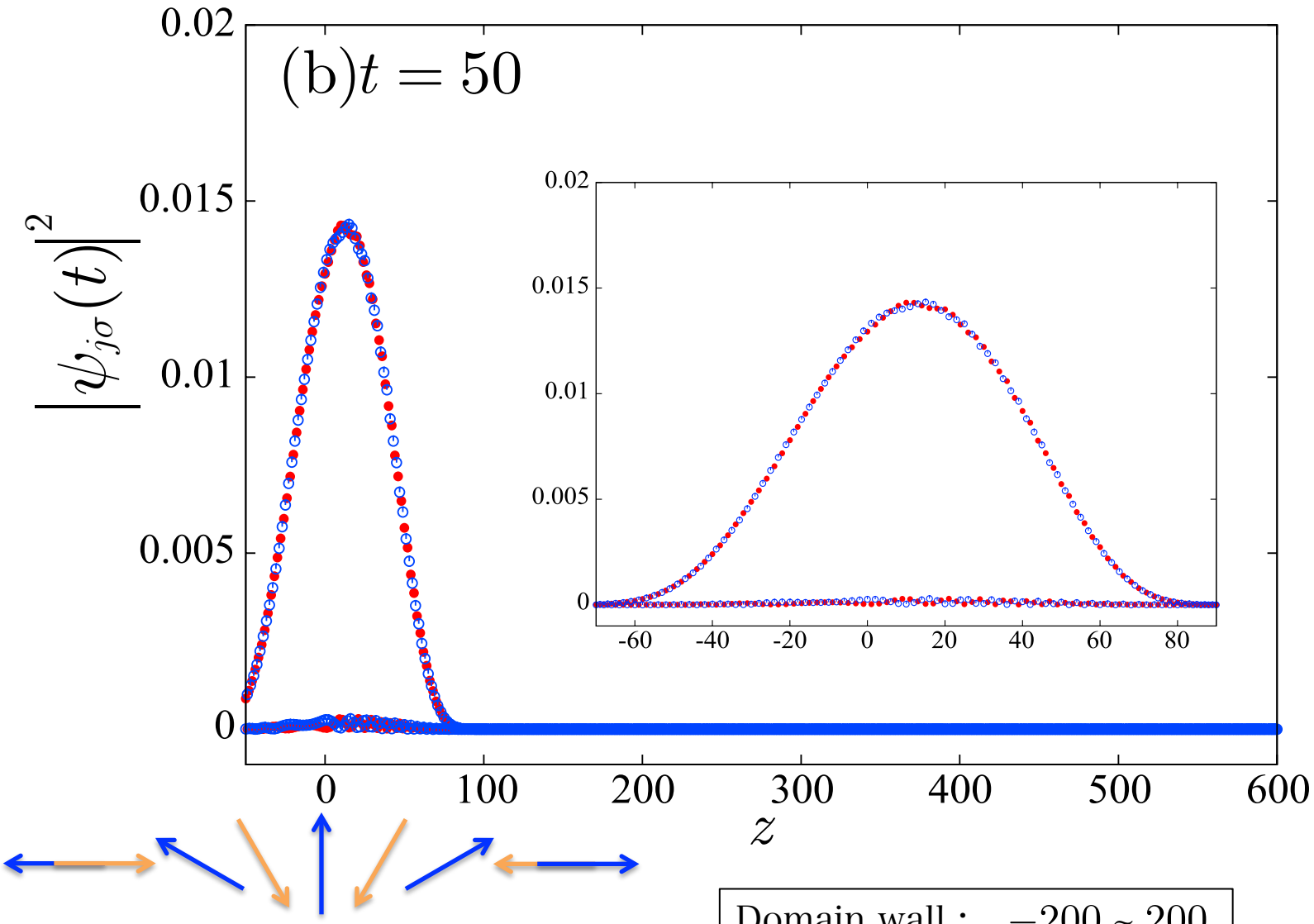
Time evolution of wave packet



Domain wall : $-200 \sim 200$

· Numerically simulation result

Time evolution of wave packet



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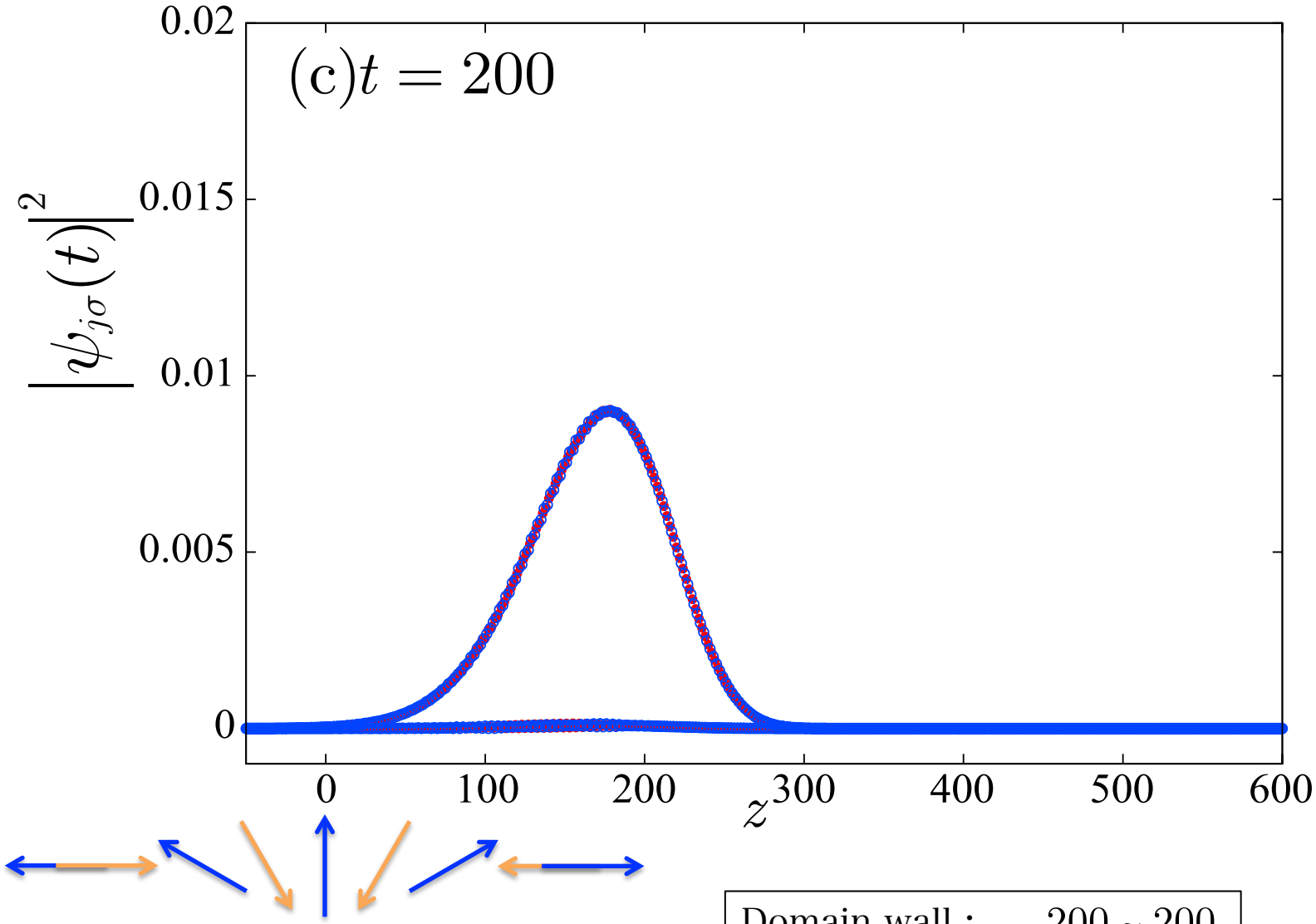

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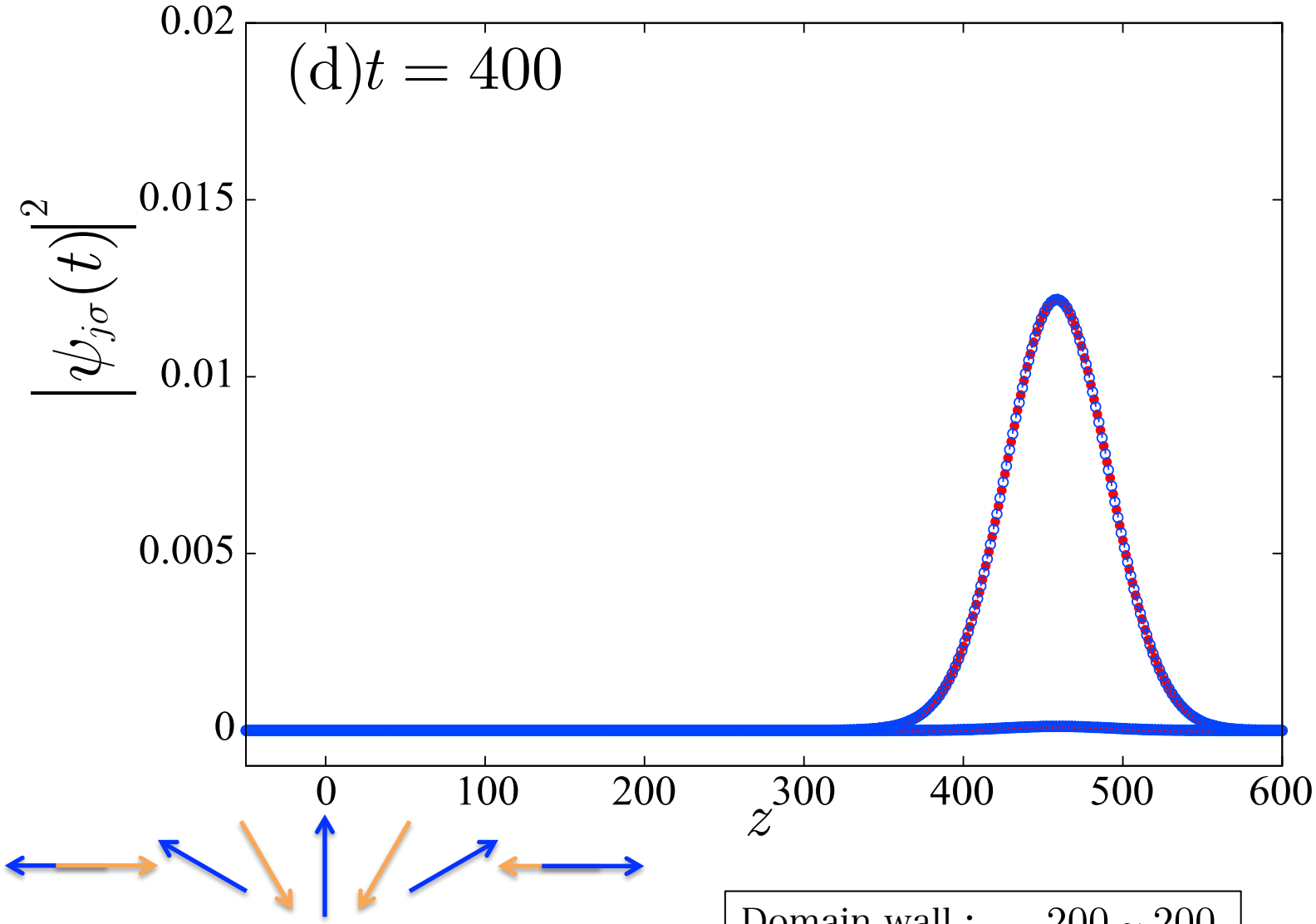

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