Ī ſ G ſ ☆

@ fG f , f
G @
F @ f G f 3 G @
F f -
@ @
A f @ f G f f @ - -
f , f 4 @ f f G -

N @ f @ FF f
( ) 8) 1)

$$\delta, \quad (4)$$

F f

$$\hat{\sigma} \quad 2\pi\sigma. $$

@ F @,

$$\frac{\pi}{} \int_{\infty}^{\infty} \frac{\omega^2}{4} \; \omega \; \omega, \quad (6)$$

(3)

$$G \quad \frac{\pi}{} \int_{\infty}^{\infty} \frac{\pi^2\omega^2}{} \; 2\pi\,\omega \quad 2 \quad \omega.$$

C @ @ f @ @ $2\pi\omega$,

$$G \quad \frac{\pi}{} \int_{\infty}^{\infty} \frac{\pi^2\omega^2}{} \; 2\pi\omega \quad 2 \; 2\pi\omega \; \omega \quad \frac{\pi}{} \int_{\infty}^{\infty} \frac{\pi^2\omega^2}{} \; 2\pi\omega \; \hat{} \; \frac{}{\pi} \; \omega \; \omega. \quad (8)$$

f G f $\frac{\pi^2\omega^2}{}$ @ (8)
F ϵ, @ (8) (
) $\omega <$, ϵ/π $\leqslant \frac{1}{2}$, f $\hat{}\;\xi$

$$\xi < \frac{}{2\pi} \quad \frac{\epsilon}{\pi}. \quad (9)$$

W f L G
$\lambda >$ γ_λ λ^2, F f $\hat{\gamma}\;\xi$, (4))

$$\lambda \; \xi \quad \sum_{\in\mathbb{Z}} \hat{\gamma}_\lambda \; \xi \quad {}^2. \quad (10)$$

@ @ 3, f $\xi \leqslant \frac{N}{2}$

$$\hat{}\;\xi \approx \frac{1}{\lambda \; \frac{\xi}{\nu N}} \quad \hat{}\;\gamma_\lambda \; \nu\xi, \quad (11)$$

g 26) N ν @N
@ f(9) N 2, (11) (8)

$$G \approx \tilde{G} \quad \frac{\pi}{} \int_{\infty}^{\infty} \frac{\pi^2\omega^2}{} \; 2\pi\omega \quad \hat{} \; \frac{\gamma_\lambda \; \nu \frac{}{\pi} \; \omega}{\lambda \; \frac{/\pi \; \omega}{\nu N}}. \quad (12)$$

C @ @ @ (12)

$$\tilde{G} \quad \frac{\pi}{} \; \hat{} \int_{\infty}^{\infty} \frac{\pi^2\omega^2}{} \; 2\pi\omega \; \frac{\gamma_\lambda \; \nu \; \frac{}{\pi} \; \omega}{\lambda \; \frac{/\pi \; \omega}{\nu N}} \; \omega. \quad (13)$$

@ 1 (A A), , λ ξ f ξ < $\frac{1}{4}$ G A ,
@ (1 3) ; fG @ f
N ,

$$\frac{\pi}{,} \int_{-\infty}^{\infty} \frac{\pi^2\omega^2}{,} \; 2\pi\,\omega \;\; \lambda \;\; v^2 \; \frac{}{\pi} \;\; \omega \;\; ^2 \; \frac{\pi\omega^{\;2}}{vN^{\;2}\lambda} \;\; \omega$$

$$\frac{vN \;\; \lambda\pi}{\kappa} \times \frac{\lambda^2 v^2 N^2 \;\, \pi \;\; w \;\; ^2 \;\; \lambda \;\, ^2\pi^2, \;\; ^2\pi^2 \;\, \lambda v^2 N^2 \;\; ^2}{\kappa}$$

$$\times \;\; 2 \; \frac{^2 \;\, \pi^2 \;\; \lambda^2 v^4 N^2 \;\;\; \pi, \; \lambda^2 v^3 N^2}{\kappa} \; ,$$

$$\kappa \;\;\; \pi^2 \lambda v^2 N^2 \;\;\; \pi^2, \;\;\; \lambda^2 v^4, N^2 \; . \qquad 1\,4$$

[,

$$\tilde{G} \;\; \frac{vN \;\; \lambda\pi}{\kappa} \;\; \frac{\pi^2 \;\, \lambda v^2 N^2 \;\;\; ^2 \;\;\; 2 \;\;\; \pi^2 \;\;\; \lambda^2 v^4 N^2}{\kappa} \;\;\; ^2$$

$$\times \;\; \tilde{r} \;\; \frac{\lambda^2 v^2 N^2 \;\, \pi \;\;\; w \;\; ^2}{\kappa} \;\;\; \frac{2 \;\, \pi, \; \lambda^2 v^3 N^2}{\kappa} \; , \qquad 1$$

$$\tilde{r} \;\;\; r \;\;\; \frac{\lambda, \pi^2 \;\, ^2}{\kappa} \; . \qquad 1\,6$$

[f (3) (1) f
@ 4 1 99 84 6l [9 9626 9 9626 81 2283491 1 6 [() [Fl 4 4( )-2 31 (433)-3331 (@Fl 138 964436 3 -

(1) W @ @
f @ , 1 W @ $\frac{1}{2}, \frac{1}{2}$,
@ f , @ f , fa
(@)
M f , f @ ϵ, x s_j, f
$^2 \leqslant \epsilon$,

$\leqslant \frac{\epsilon}{\quad}$.

f , K C_k,

s ϵ 4 4 9 (M - 3 2 1
$\frac{1}{2}, \frac{1}{2}$

. W @ f FF Γ @ f

W f @ f f f
@ Γ - f @ .
N = 1 2 M f FF Γ , f @ f 3 FF Γ
f N = 1 28 FF Γ f N = 81 92
F Γ 1 @ 3, -
,
Γ 1 , a <1 38 Γ f , Γ 1 -
f

5. Conclusions

W -8 8 8 W 8 8-41 4 (W)-239 (8) 3 f ,

@ Γ @ f

, , , ,

F

M f ,

$, \lambda\ \xi$ $\hat{\gamma}_\lambda\ \xi$ $,$ ^{2,} A .4

$, \in \mathbb{Z}$

A fP ’ f A(9) @

$$\mathscr{P}^{v} \quad \int_{\infty}^{\infty} {}^{2\pi \quad \xi}\, \hat{}\; vN\xi \; \hat{\gamma}_{\lambda} \; \xi \quad \xi, \qquad \text{A } 1$$

, ,

$$\mathscr{P}^{v} \quad \int_{\frac{1}{2}}^{\frac{1}{2}} {}^{2\pi \quad \xi} \sum_{,\in\mathbb{Z}} \hat{}\; vN \; \xi \quad , \; \hat{\gamma}_{\lambda} \; \xi \quad , \quad \xi. \qquad \text{A } 11$$

W @ $\mathbb{R}$ A(1) A(11), f fλ, ξ , $\hat{\gamma}_{\lambda}$ ξ , 1 / ,
@ @
, @ f(11) f F , f f

$$F \; \xi \quad \sum_{\in\mathbb{Z}} \mathscr{P}^{v} \;) \quad {}^{2\pi \quad \xi}, \qquad \text{A } 12$$

$$F \; \xi \quad \sum_{,\in\mathbb{Z}} \hat{}\; vN \; \xi \quad , \quad \hat{\gamma}_{\lambda} \; \xi \quad , \; . \qquad \text{A } 13$$

@ f(1 3) , ξ @

Then

$$E_\infty \leqslant 1 \quad \hat{\varphi} \; \alpha \quad \frac{1}{C \quad , \alpha} \; _{, \in \mathbb{Z}} \quad C \; , \, , \alpha \; \hat{\varphi} \quad , \quad \alpha \, .$$

f$\hat{\varphi}$ f @ , 1 $\hat{\varphi}$ α

@ 1 = 1

@ ξ f $\xi \leqslant \frac{N}{2}$, α α $\frac{1}{2v}$

F @ f $v = 2$, $\xi < \frac{1}{4}$, $\hat{\varphi}$ ξ -

, $\hat{\varphi}$ $\xi \pm 1$, $\lambda <$ 1 4 F $\lambda =$ 1 4

fγ_λ 1 6,1 6 , A 9) @ f33 ,

23 f - , f

(2) C

$$F\ \xi_{.} \quad \sum_{-\frac{\nu N}{2}}^{\frac{\nu N}{2}\ 1} \mathscr{P}^{\nu} \quad 2\pi\ \xi_{.} \qquad \text{A 1 6}$$

FFT

(3) $F(\xi_j)$ $_{\lambda}\ \xi_{.}$

A.2.2. Fast evaluation of the Fourier series at unequally spaced points

W @ @ f f
f , @
L T

$$\xi \quad \frac{F\ \xi/\nu}{_{\lambda}\ \xi/\nu},$$

F(ξ) A 1 2) $a_{\lambda}(\xi)$ A 4) C f @

$$\hat{f}\ \xi \quad \sum^{\frac{N}{2}\ 1}$$

∞ ∞∞∞ ∞∞∞∞∞ ∞∞∞ ∞ /∞∈∞

$$\int_{-\infty}^{\infty} \hat{G}\left(\frac{\xi}{v}\right) \tilde{\mathscr{P}}^{v}(\xi)\, d\xi, \qquad (A.2\ )$$

$$\hat{G}(\xi) \quad \sum^{\frac{N}{2}-1}_{-\frac{N}{2}} \frac{\quad}{\left(\ \ \lambda\ \frac{1}{vN}\right)} \quad \frac{2\pi\ \xi}{N}. \qquad (A.21)$$

(A.19) (A.2)

$$\int_{-\infty}^{\infty} \sum_{\in\mathbb{Z}} \hat{G}\left(\frac{\ }{v}\right) \gamma_{\lambda}\, vN\tilde{\ } \quad N\xi\ ), \qquad (A.22)$$

$$\hat{\ }\ \xi \quad \sum_{\in\mathbb{Z}} \hat{G}\left(\frac{\ }{v}\right) \gamma_{\lambda}\, v\xi \quad . \qquad (A.23)$$

N $\hat{G}$ $\frac{\ }{v}$ ( ) ,

$$\tilde{\ } \quad \frac{\quad}{\ \lambda\ \frac{\ }{vN}}, \quad \frac{N}{2} \leqslant \ \leqslant \frac{N}{2} - 1; \qquad (A.24)$$

, .

A FF $\tilde{\ }^{\frac{vN}{2}-1}_{\ \ \frac{vN}{2}}$ $\hat{G}\ \frac{\ }{v}$

W F

Algorithm 2.

(1) C $\tilde{\ }$ (A.24)
(2) A FF $\hat{G}\ \frac{\ }{v}$
(3) C $\hat{\ }\ \xi$ (A.23)

A.2.3. Evaluation of unequally spaced FFT at unequally spaced points

W (A.14),
$_1 \in \left[-\frac{1}{2}, \frac{1}{2}\right)$ $\xi \in \left[-\frac{N}{2}, \frac{N}{2}\right)$ -

Algorithm 3.

(1) C

$$\mathscr{P}^{v} \quad \gamma_{\lambda}\ vN\ _1 \quad \frac{\ }{vN} \quad , \quad -\frac{v^2N}{2}, \ldots, \frac{v^2N}{2} - 1 \qquad (A.2\ )$$

( ) $-\frac{v}{2}, \frac{v}{2}$

(2) λ,

$$\frac{\mathscr{P}^{v}}{\ \lambda\ \frac{\ }{v^2N})}$$