_N r r
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_N

2 The HAM-based approach

r rt t r t r t t t r r (1,),
r t tr t t r t r r r t t

$$- p \; L[\;,x;p \; - u \; ,x \,] = p \quad N[\; ,x;p\,].$$ ( )

r p [.] r t r, - tr r t r, $,x;p$ t , r t . r t (1), t r r r t r L

$$L[\; ,x;p\,] = \frac{\;^{n}\; ,x;p}{\; x^{n}}.$$ ( )

t r r t r N

$$N[\; ,x;p\,] = \frac{\;^{n}}{\; x^{n}} - f \quad x, \; \frac{\;}{\; x}, \ldots, \frac{\;^{n-}}{\; x^{n-}}$$ ( )

T t $u \; ,x$ t t $u \; ,x$ t r t r t r .

(1), t t $u \; ,x$ r t t

$$\{x^{n} \mid n = \; . \; . \; ,\ldots\}$$ ( )

t r

$$u \; ,x = \sum_{n=}^{+\infty} d_n x^{n}.$$ ( )

r d_n, $n = \; . \; . \; ,\ldots$ r t t t r t r. T r t t *rule of solution expression*.

r t t r t r ( ), t t $u \; ,x$

$$u \; ,x = x^{n} + a_{n-} x^{n-} + \cdots + a \; x \; + a \; x + a$$ (T ( )-

r t t r t r ( ), t r t (1) r

$$u^n_m(x) = \sum_{k=0}^{N,m} d_k x^k. \qquad (1\ )$$

r t r t N, m m.

S t t $u^n_m(x) = x^k$ t t r t (1) r

$$u_m(x) = \frac{k!}{(k+n)!} x^{k+n} + \dots x^{n-} + \dots_{n-} x^{n-} + \cdots + \dots x + \dots_0 . \qquad (\ 0)$$

r , (1), ... t r t n r t , t (1), (0) t r t L , t

$$u_m(x) = \sum_{k=0}^{N,m} d_k$$

[illegible]

3 Applications

[illegible]

T t r r r t r $u_m(x)$, t mt r r r t t
(1) t r t (1) r t

$$u_m(x) = \chi_m u_{m-1}(x) + \hbar R_m(\mathbf{u}_{m-1}, x). \quad (10)$$

$$u_m(0) = 0, \quad u_m(1) = 0. \quad (11)$$

r

$$R_m(\mathbf{u}_{m-1}, x) = u''_{m-1}(x) + u_{m-1}(x) + (1 - \chi_m) x^2 - \sum_{j=0}^{m-1} u_{m-1-j}(x) \sum_{i=0}^{j} u_i(x) u_{j-i}(x), \quad ( )$$

t , t $u_m(x), m = 1, 2, \ldots$ r r . r ,
$m = 1$, (10)

$$u_1(x) = u_0(x) + \hbar\left[u''_0(x) + u_0(x) + x^2 - u_0(x)^3\right]$$
$$= - h \left[x - x + x - x + x - x + \right], \quad ( )$$

S t r (10)

$$u(x) = \frac{x^{k+1}}{(k+1)(k+2)} - \frac{x}{k+1} + \frac{1}{k+2}. \quad ( )$$

(11), t r t r r t r

$$u(x) = - (x -)(x -)$$
$$\times \left[x - x + x - x + x - x + \right] \quad ( )$$

$u_m(x), m = 1, 2, \ldots$ t r .
T mt r r r t r

$$u(x) \approx \sum_{m} $$

t r t ( ), t t t r t t ( ) r t r

$$u \, x = x - x .\tag{1}$$

$$; p = . \frac{; p}{x} = . ; p = \tag{}$$

T t r r r t r $u_m x$, t mt r r r t t (1) t r t (1) r t

$$u_m x = m u_m$$

Table 2 t rr r r t t (,)

x			t	10t	1 t
0.1	0.001	0	. −	1. −	. −
0.	0.00	1 10	. −	1. −	1. −
0.	0.010	1 0	. −	1. −	. −
0.	0.01		. −	1. −	. −
0.	0.0 0	0	. −	1. −	. −
0.	0.0		. −	1. −	. −
0.	0.0	0	. −	.0 −	1. −
0.	0.0 1	1	. −	. −	1. −
0.	0.01		. −	. −	1.1 −

t t

$$u \quad x = x \quad - x \tag{ }$$

T r r r t - r t . t rt t t t t t r t t t t r (1,), t r r S t t t t. r t r t r r r t t ( ), t r r r t r L

$$L[\; x; p] = \frac{\; x; p}{x}. \tag{ }$$

t r r t r $N[\; x; p]$

$$\frac{\; x; p}{x} + \; x; p - x^{-}$$

[redacted]

$$x = u_1(x) + u_1(x) \ldots$$ [redacted]

$$= x - x + \ldots$$ [redacted]

$$+ \; - \; x^{-} \ldots$$ [redacted]

(0) [redacted]

$$= \frac{k!\, x^{k+}}{(k+\;)!} - \frac{\ldots}{(k+\;)(k\ldots} $$ [redacted]

[redacted]

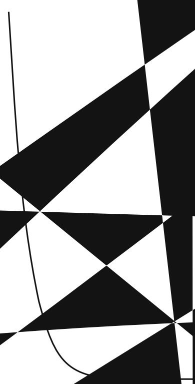
$$u(x) = \frac{x}{\ldots} - \frac{x}{\ldots} \ldots$$

$$+ x - \ldots$$ [redacted]

$m =$ [redacted]

$$u(x) \approx \sum_{k=1}^{m} u_k(x) = \sum_{i=1}^{m+\ldots} \ldots$$ [redacted]

[redacted] (1, [redacted]



[redacted]

Table 3 t rr r r r t

x	tS	r	t	10t	1 t
0.0 1	0.0	1. −	. −1	. − 1	1. − 1
0.1 1	0.0 0	0. −	1.1 −1	. − 1	. − 1
0. 10	0.0 1	0. −	1. −1	. − 1	.1 − 1
0. 0	0.0 10	0. −	1. −1	. − 1	. − 1
0. 000	0.0	0. −	.1 −1	. − 1	. − 1
0.	0.0 1	0.1 −	. −1	. − 1	. − 1
0. 0	0.0 0	0. −	. −1	. − 1	. − 1
0.	0.01 000	0.0 −	. −1	. − 1	. − 1
0. 0	0.00	0.0 −	. −1	. − 1	. − 1

r t t $m.i$ $m.j$ $m.i$ $m.j$ r t . t ( ) r t t t t r (1,) t r t r - tr r t r .

T t r , t - r t 1 t r r r - t ( ) t $x = -$ r . , r t t t t r t − . − .

= − , t r t t r r t t t r t t - r t T , r t r t rr r t - r t -