|  |  |
| --- | --- |
| (4) | $ϕ\_{n}\left(ζ\_{n}\right)=\sum\_{i=0}^{m}a\_{i}Υ^{i}\left(ζ\right)+\sum\_{i=1}^{m}b\_{i}Υ^{-i}\left(ζ\right),$  |









|  |  |
| --- | --- |
| (13) | $ϕ\_{n}\left(ζ\_{n}\right)=a\_{0}+a\_{1}Υ\left(ζ\_{n}\right)+\frac{b\_{1}}{Υ\left(ζ\_{n}\right)},$  |
|  | where |
| (14) | $Υ\left(ζ\_{n}\right)=\frac{p\_{1}e^{q\_{1}ζ\_{n}}+p\_{2}e^{q\_{2}ζ\_{n}}}{p\_{3}e^{q\_{3}ζ\_{n}}+p\_{4}e^{q\_{4}ζ\_{n}}},$  |



|  |  |
| --- | --- |
| **(15)** |  |
| **(16)** |  |

***#* We assume *p* = [−1*,* 1*,* 1*,* 1] and *q* =[1*,*−1*,* 1*,*−1], and so expression (14) turns to**

|  |  |
| --- | --- |
| **(17)** | $Υ\left(ζ\_{n}\right)=-\frac{sinh\left(ζ\_{n}\right)}{cosh\left(ζ\_{n}\right)}=-tanh\left(ζ\_{n}\right),$ |

|  |  |
| --- | --- |
| **(18)** | $ϕ\_{n+1}\left(ζ\_{n+1}\right)=a\_{0}+a\_{1}Υ\left(ζ\_{n}+g\right)+\frac{b\_{1}}{Υ\left(ζ\_{n}+g\right)},$ |
| **(19)** | $ϕ\_{n-1}\left(ζ\_{n-1}\right)=a\_{0}+a\_{1}Υ\left(ζ\_{n}-g\right)+\frac{b\_{1}}{Υ\left(ζ\_{n}-g\right)},$ |

**Equations 17, 18 and 19 are placed in 15 and 16.**

**And then I think they will be simplified with the following commands:**

**simplify(eq01); fin1 := simplify(numer(%));**

**simplify(eq02); fin2 := simplify(numer(%));**

**subs(tanh(xi[n]) = Psi, fin1); fin3 := simplify(%);**

**subs(tanh(xi[n]) = Psi, fin2); fin4 := simplify(%);**

**for i from 0 to degree(fin3, Psi) do**

 **EQ[i] := simplify(coeff(fin3, Psi, i));**

**end do;**