**gfun[diffeqtorec]** - convert a linear differential equation into a recurrence

**Calling Sequence**

diffeqtorec(deq, y(z), u(n))

**Parameters**

deq - linear differential equation in y(z) with polynomial coefficients

y, z - name and variable of the function

u, n - name and index of the recurrence

**Description**

- Let \( f \) be a power series solution of the differential equation. If \( u(n) \) is the \( n \)-th Taylor coefficient of \( f \) around zero, the procedure outputs a linear recurrence for the numbers \( u(n) \), with rational coefficients in \( n \).

- The syntax is the same as that of `dsolve`. Combined with `algeqtodiffeq` `gfun[algeqtodiffeq]`, this procedure produces a linear recurrence for the Taylor coefficients of an algebraic function.

**Examples**

```plaintext
> with(gfun):
   diffeqtorec(y(z)=a*diff(y(z),z),y(z),v(n));
   v(n) + (-a n - a) v(n + 1)  (2.1)

> deq:=algeqtodiffeq(y=1+z*(y^2+y^3),y(z),{}):
   diffeqtorec(deq,y(z),u(m));
   \{u(0) = 1, (-m - 2 m^2) u(m) + (-9 - 30 m - 18 m^2) u(m + 1) + (279 + 227 m
       + 46 m^2) u(m + 2) + (-26 m - 42 - 4 m^2) u(m + 3), u(1) = 2, u(2) = 10\}  (2.2)
```

**See Also**

gfun, gfun[algeqtodiffeq], gfun[rectodiffeq], dsolve, dsolve[formal_series]