

SIP #2 : Rewriting of the Scilab function **dassl** to match ODE profile

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Title: Rewriting of the Scilab function **dassl** to match ODE profile

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Abstract

This SIP proposes solutions for the rewriting of the Scilab function **dassl** to match **ode** profile.

Rationale

In Scilab, in the module `differential_equations`, we have two functions **ode** and **dassl** which solve respectively « ordinary differential equations » and « differential algebraic equations ». We would like to rewrite **dassl** in order to have a similar call that of the function **ode**. This rewriting will especially allow to simplify the use of this function and to be more coherent with the function **ode**. In this aim we think about two solutions:

- We can modify the native (C or fortran) source code in order to manage the new function profile.
- We can also create a new Scilab macro with the new profile (input and output arguments) which will call the actual native **dassl** function.

After having looked the source code the first solution seems rather difficult to realize. Indeed, the function source code contains numerous routines with a lot of arguments. The second solution seems more realist.

We choose for the function name **dae** for Differential Algebraic Equation.

Always in a purpose of simplification and coherence, we decided to include also the function **dasrt** in the new macro **dae**.

dassl actual calling sequence

```
[r [,hd]]=dassl(x0,t0,t [,atol],[rtol]),res [,jac] [,info] [,hd])
```

dasrt actual calling sequence

```
[r,nn[,hd]]=dasrt(x0,t0,t[,atol],[rtol]),res[,jac],ng,surf[,info][,hd])
```

ode calling sequence

```
y=ode(y0,t0,t,f)  
[y,w,iw]=ode([type],y0,t0,t [,rtol [,atol]],f [,jac] [,w,iw])  
[y,rd,w,iw]=ode("root",y0,t0,t [,rtol [,atol]],f [,jac],ng,g [,w,iw])  
y=ode("discrete",y0,k0,kvect,f)
```

Example Usage

Function call by default. Some arguments will become optional with a value by default.

```
[y]=dae(x0,t0,t,res)  
[y,nn]=dae(«root»,x0,t0,t,res,ng,surf)
```

Function with optional arguments. The users can choose different values for the optional arguments.

```
[y [,hd]]=dae(x0,t0,t [,rtol,[atol]],res [,jac] [,info] [,hd])  
[y,nn[,hd]]=dae(«root»,x0,t0,t[,rtol,[atol]],res[,jac],ng,surf[,info]  
[,hd])
```

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