1 SUMMARY

Computes values of the **complete elliptic integrals** of the **1st and 2nd kind,** viz.

$$K(m) = \int_0^{\frac{\pi}{2}} (1 - m^2 \sin^2 \theta)^{-\frac{1}{2}} \, d\theta \qquad 0 \le m^2 < 1$$

$$E(m) = \int_0^{\frac{\pi}{2}} (1 - m^2 \sin^2 \theta)^{\frac{1}{2}} \, d\theta \qquad 0 \le m^2 < 1$$

The subroutine uses an approximation of the form

$$\sum_{k=0}^{n} (1 - m^2)^k \left\{ b_k \log_e \left(\frac{1}{1 - m^2} \right) \right\}$$

see for $n = 4$ C.R. Hastings, 'Approximations for digital computers'.

ATTRIBUTES — **Version:** 1.0.0. **Types:** FB01A; FB01AD. **Calls:** FD05. **Original date:** 1967. **Origin:** S.Marlow, Harwell.

2 HOW TO USE THE PACKAGE

The single precision version

        CALL FB01A(EMSQ,OPT,VK,VE)

The double precision version

        CALL FB01AD(EMSQ,OPT,VK,VE)

EMSQ   is a REAL (DOUBLE PRECISION in the D version) variable which must be set by the user to the floating point value of m^2. **Restriction:** $0 \le m^2 < 1$.

OPT   is a REAL (DOUBLE PRECISION in the D version) variable which must be set by the user to control which integral is required. The possible values are

1. to evaluate only $K(m)$.

2. to evaluate only $E(m)$.

3. to evaluate both integrals.

VK   is a REAL (DOUBLE PRECISION in the D version) variable which is set by the subroutine to the value of $K(m)$. It is only set if selected by the argument OPT.

VE   is a REAL (DOUBLE PRECISION in the D version) variable which is set by the subroutine to the value of $E(m)$. It is only set if selected by the argument OPT.

3 GENERAL INFORMATION

Use of common: none.

Workspace: none.

Other routines: calls `FD05`.

Input/Output: none.

Restrictions:

$0 \leq m^2 < 1$,

`OPT` can only take values 1, 2 or 3.

Accuracies:

 6 figures using 4-byte arithmetic

14 figures using 8-byte arithmetic