**INTERNAL FORCES OF A CONTINUOUS BEAM**

**NAME**: ***Field\_3***

This program calculates for a two- or three-span beam the extreme support moments, all maximum shear- and reaction forces and the maximum field moments with their current location.

For each field a uniformly distributed ( index “**u**” ) and a trapezoidal load (index “**t**” ) consisting of dead and live load are provided ( figure 1. ). Any combination of the sections “a” and “b” is possible, i. e. triangle loads may be created by setting a + b = L (field 1 of the example ) or uniformly distributed loads by setting a = b = 0, as for field 2 of the example. The live loads may

defined as working independently ( single ) or simultaneously ( together on all spans, i. e. snow- or wind loads acting at the same time).

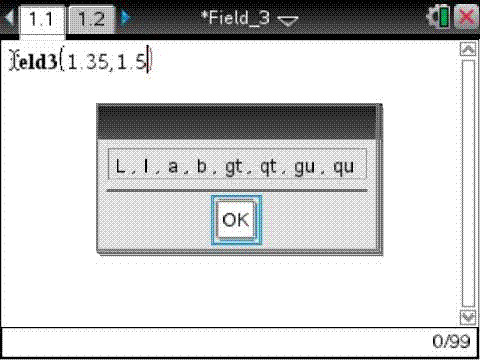
How to run the program in detail will be shown in the following example ( figure 2 ).

**EXECUTION:**

Transfer the program to MyLib and choose ***field\_3***, then go on page 1.1 of the document.

To get the extreme internal forces the loads are multiplied by corresponding safety factors, which you have to enter now when you start the program by keying in **feld3(g,q)**. The following loads then are multiplied in the form: qd = gt\*****g****qt****\* ****q and qdu = gu\*****g****qu****\* ****q, respectively. For European standards these safety factors are: **g = 1,35** and **q = 1,5.** So, in our case, start the program by keying in **feld3(1.35,1.5)** (fig. 3) .

fig. 3) fig. 4)



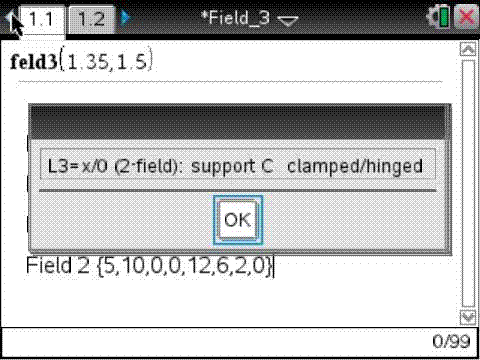
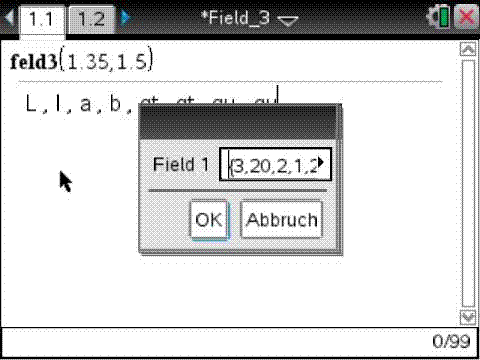
After that you are asked whether you want to enter the last system you have examined or a new one. Here enter **“0”** (new system ). Now you have the option to define the live loads as acting independently ( default value **“1”** ) or simultaneously ( key in **“2”** ). Leave the default **“1”** in the display and press **“enter”**. In the following box a hint is displayed for the sequence how to enter the values for each field ( fig. 4 ), where:

**L** = length of field, **I** = moment of inertia , **a** and **b** = sections of the trapezoidal load,

**gt, qt, gu, qu** = dead and live loads according to fig. 1.)

Press “**enter**” and key in referring to fig. 1 and fig. 2 : {**3,20,2,1,27,20,4,0**} for field 1 (fig. 5 ).

fig. 5) fig. 6)



Do the same for field 2: {**5,10,0,0,12,6,2,0**}.

Now a note is displayed what to do if you want to examine a **two**-field beam (L3=0) (fig.6).

If there is a hinged support at bearing “**C**” you would have to enter {0,0,0,0,0,0,0,0} in the

field for span 3, otherwise, if support “C” is clamped enter {**x**,0,0,0,0,0,0,0}.

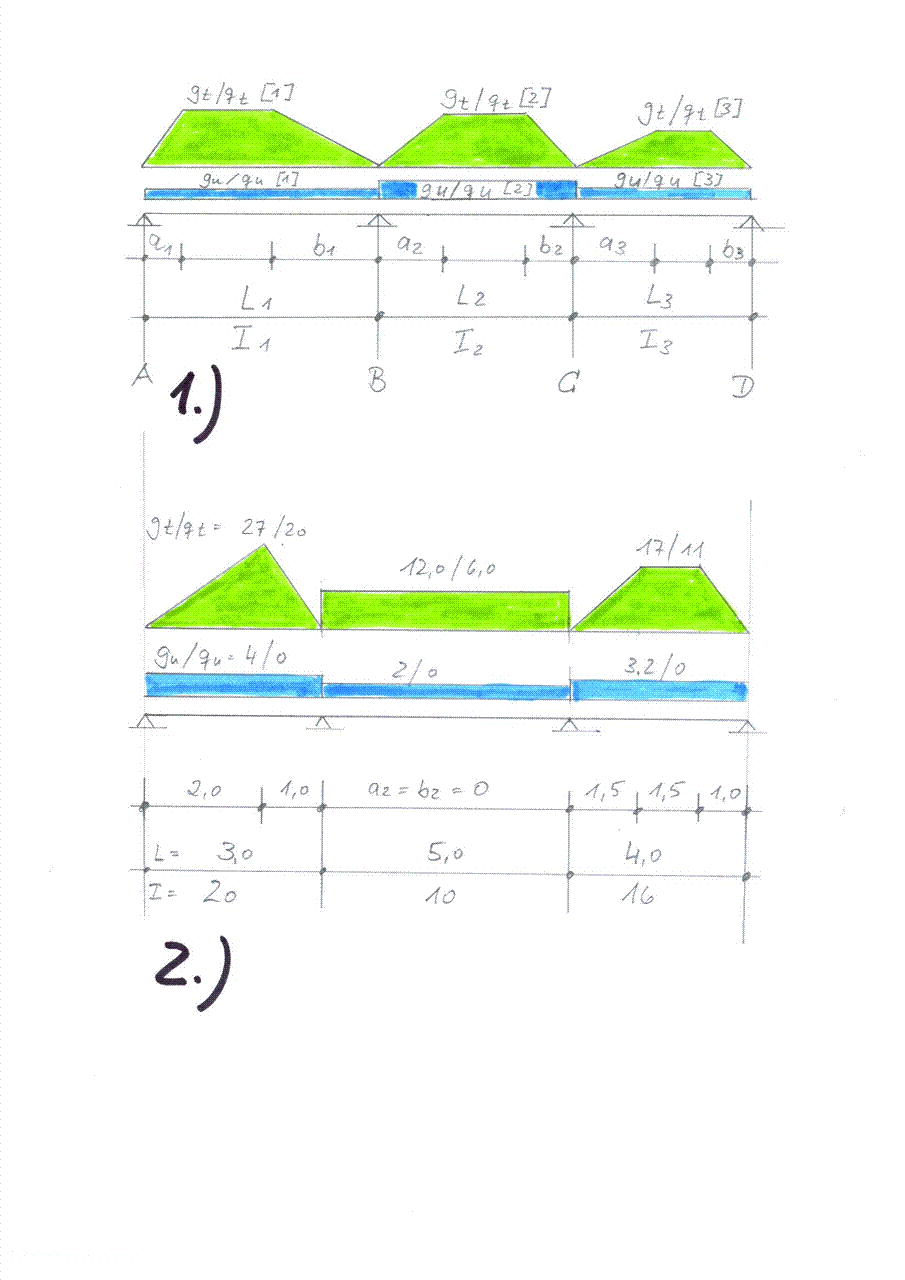
*-field\_3-*

Press “**OK**” in the touchpad or “**enter**” and input in this example {**4,16,1.5,1,17,11,3.2,0**} for this field. The first results that are now displayed are the extreme support moments:

**Mb = - 58.546 , Mc = -66.268** (fig. 7 ).

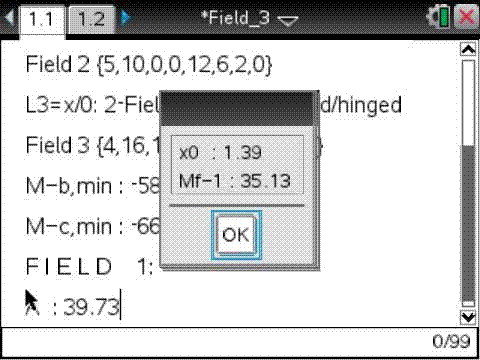
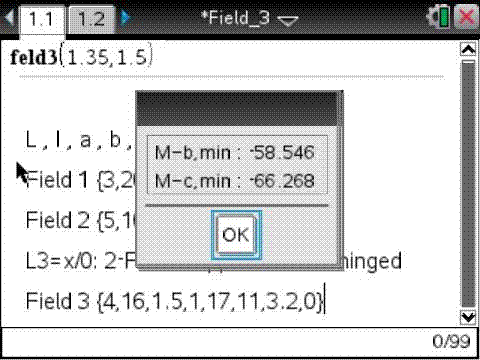
*-to be continued on page 3-*

**Fig. 1) and 2.)**



*-field\_3-*

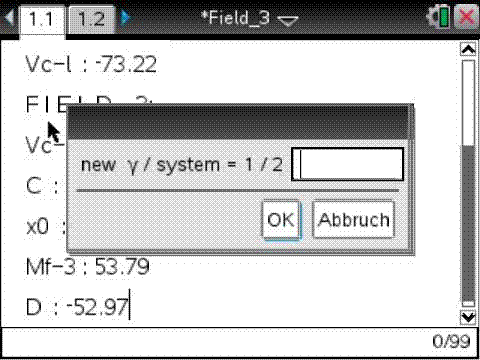
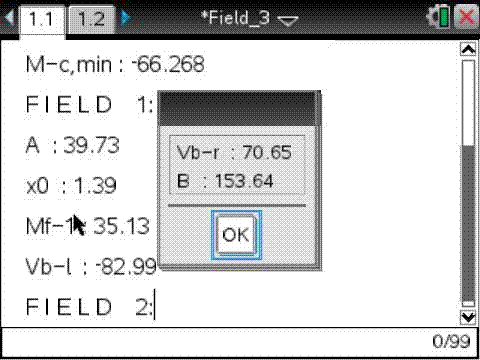
fig. 7) fig. 8)



Press “**enter**” ( or “**OK**” ) to retrieve the next results:

“**FIELD 1**” , “**A = 39.73**“ , ”**x0 = 1.39, Mf-1 =** **35.13**“ (fig. 8) , ”**Vb-l = -82.99**“ , ”**FIELD 2**” ,

fig. 9) fig. 10)



“**Vb-r = 70.65 , B = 153.64**” (fig. 9). B stands for the sum of -Vb-l and Vb-r at support “**B**”.

Press “**enter**” and see:

“**x0 = 2.48, Mf-2 =** **32.78**“ , “**Vc-l = -73.22**“ , “**FIELD 3**” , “**Vc-r = 76.57, C = 149.79**“ ,

“**x0 = 2.34, Mf-3 =** **53.79**“ , “**D =** **52.97**“.

In the now following request ( fig. 10 ) you may change the safety factors for a new run ( enter “**1**” ) or change the system maintaining the same **g** and **q** ( enter “**2**” ). To leave the program enter “**0**”.

The last system will be stored for the next start of the program.

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*Claus Dachselt*

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