

Plasticiteit en grensspanningshypothesen

GEWAPEND BETON 2D

Eurocode

Case	n_{sx}	n_{sy}	n_c
$n_x \geq - n_{xy} $ $n_y \geq - n_{xy} $	$n_x + n_{xy} $	$n_y + n_{xy} $	$-2 n_{xy} $
$n_x < - n_{xy} $ $n_y \geq \frac{n_{xy}^2}{n_x}$	0	$n_y - \frac{n_{xy}^2}{n_x}$	$n_x + \frac{n_{xy}^2}{n_x}$
$n_x \geq \frac{n_{xy}^2}{n_y}$ $n_y < - n_{xy} $	$n_x - \frac{n_{xy}^2}{n_y}$	0	$n_y + \frac{n_{xy}^2}{n_y}$
Other	0	0	$\frac{n_x + n_y}{2} - \sqrt{\left(\frac{n_x - n_y}{2}\right)^2 + n_{xy}^2}$

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- Situatie

$$n_{xx}=1200, n_{yy}=-200, n_{xy}=-400 \text{ kN/m}$$

$$f_y = 500 \text{ N/mm}^2, f'_c = 30 \text{ N/mm}^2$$

$$\text{Wanddikte} = 100 \text{ mm}$$

- Wapening

$$n_{sx} = 1200 + 400 = 1600 \text{ kN/m}$$

$$n_{sy} = -200 + 400 = 200$$

- Beton

$$n_c = -2 \times 400 = -800 \text{ kN/m}$$

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$$A_{sx} = 1600/500 = 3.20 \text{ mm} = 3200 \text{ mm}^2/\text{m}$$
$$2\varnothing 12-280 = 2\pi/4 \times 12^2 \times 1000/280 = 3231$$

OK

$$A_{sy} = 200/500 = 0.40 \text{ mm} = 400 \text{ mm}^2/\text{m}$$
$$2\varnothing 6-500 = 2\pi/4 \times 6^2 \times 1000/500 = 452 \text{ OK}$$

$$\sigma_c = 800/100 = 8 \text{ N/mm}^2 < f'_c \text{ OK}$$

(veiligheidsfactoren weggelaten)

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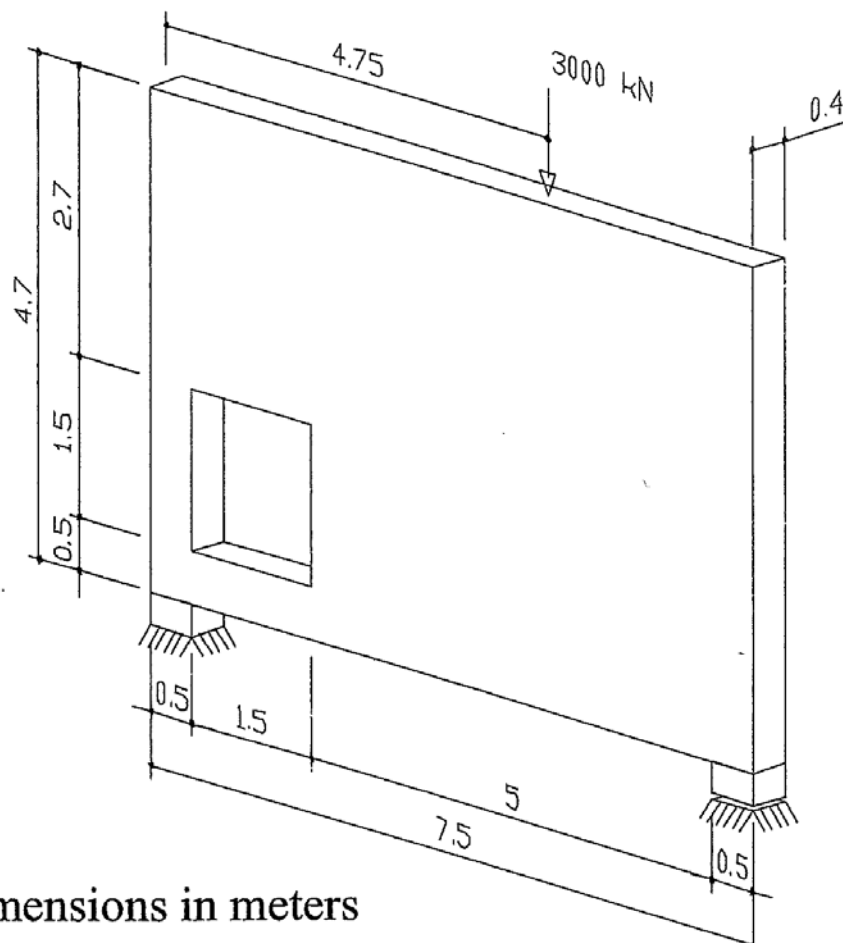
Wandligger 4.7 x 7.5 m

2 oplegging

opening 1.5 x 1.5 m

puntlast 3000 kN

$f_{cd} = 16.67 \text{ N/mm}^2$, $f_{yd} = 435 \text{ N/mm}^2$

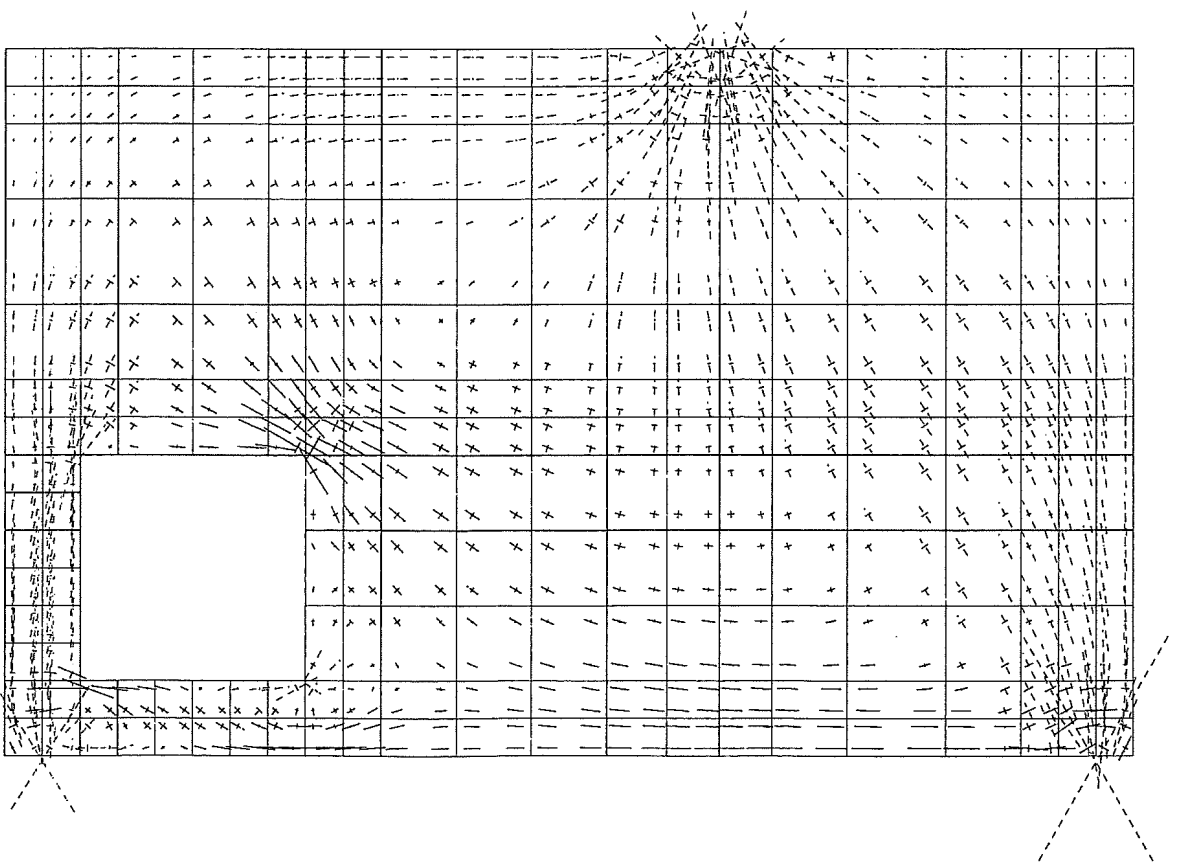


Dimensions in meters

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Hoofdspanningen (lineair elastisch)



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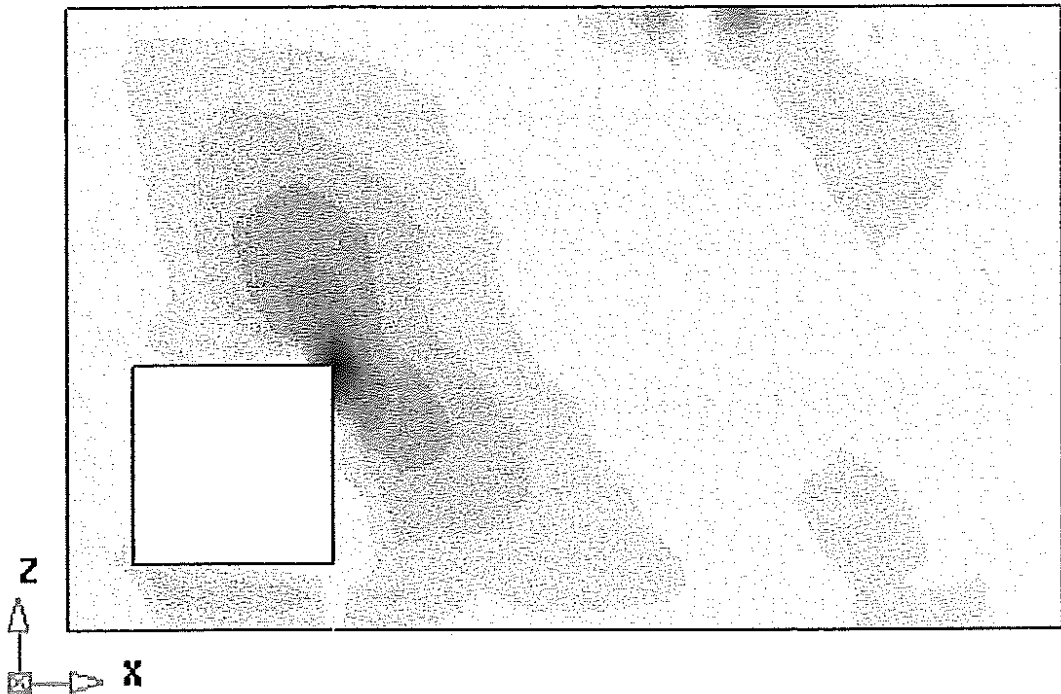
Horizontal reinforcement

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 $A_{xx} \text{ (cm}^2 \text{ / m)}$

70
 63.7
 57.5
 51.2
 44.9
 38.6
 32.4
 26.1
 19.8
 13.5
 7.27
 1



Vertical reinforcement

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Wapeningskeuze

