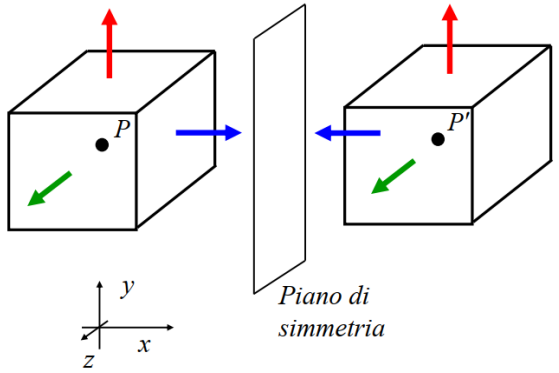
SIMMETRIA

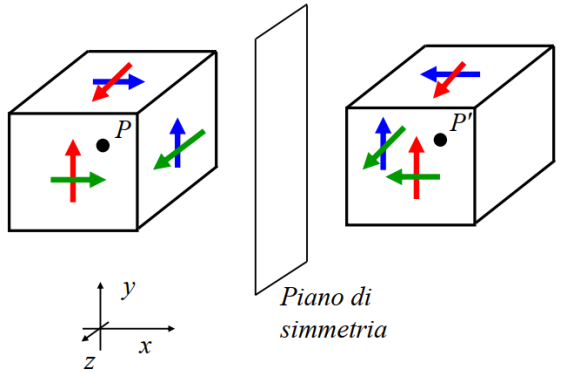
Relazioni di simmetria sulle tensioni normali



$$\sigma_x(P) = \sigma_x(P')$$
$$\sigma_y(P) = \sigma_y(P')$$
$$\sigma_z(P) = \sigma_z(P')$$

*Riferimento: http://people.unipi.it/static/ciro.santus/Didattica.html

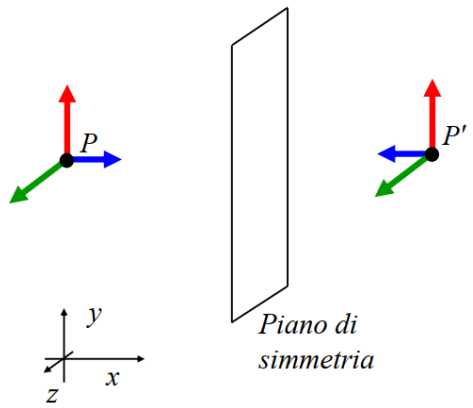
Relazioni di simmetria sulle tensioni tangenziali



$$\tau_{xy}(P) = -\tau_{xy}(P')$$
$$\tau_{yz}(P) = \tau_{yz}(P')$$
$$\tau_{xz}(P) = -\tau_{xz}(P')$$
$$\Rightarrow$$
$$\tau_{xy}(\text{sul piano}) = 0$$
$$\tau_{xz}(\text{sul piano}) = 0$$

*Riferimento: http://people.unipi.it/static/ciro.santus/Didattica.html

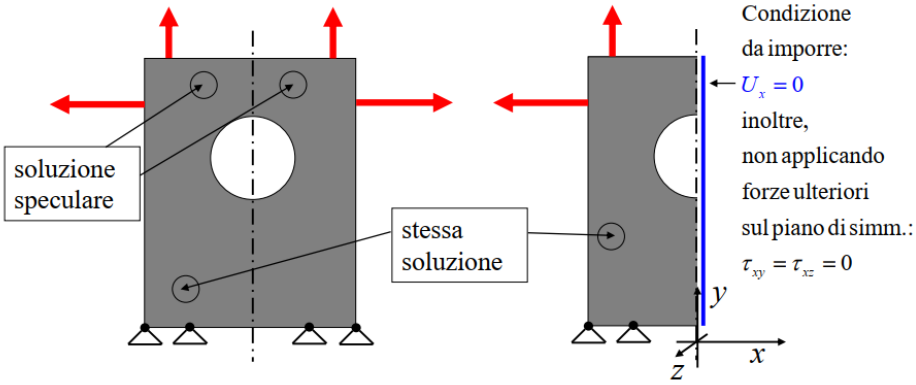
Relazioni di simmetria sugli spostamenti



$$U_x(P) = -U_x(P')$$
$$U_y(P) = U_y(P')$$
$$U_z(P) = U_z(P')$$
$$\Rightarrow$$
$$U_x(\text{sul piano}) = 0$$

*Riferimento: http://people.unipi.it/static/ciro.santus/Didattica.html

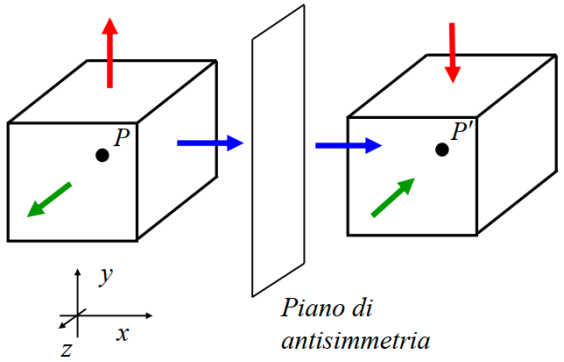
Modellazione equivalente



*Riferimento: http://people.unipi.it/static/ciro.santus/Didattica.html

ANTISIMMETRIA

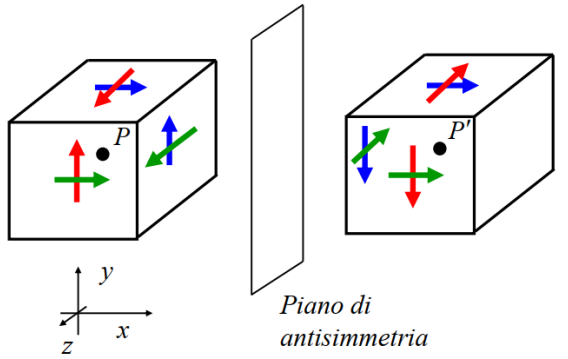
Relazioni di antisimmetria sulle tensioni normali



$$\sigma_x(P) = -\sigma_x(P')$$
$$\sigma_y(P) = -\sigma_y(P')$$
$$\sigma_z(P) = -\sigma_z(P')$$
$$\Rightarrow$$
$$\sigma_x(\text{sul piano}) = 0$$
$$\sigma_y(\text{sul piano}) = 0$$
$$\sigma_z(\text{sul piano}) = 0$$

*Riferimento: http://people.unipi.it/static/ciro.santus/Didattica.html

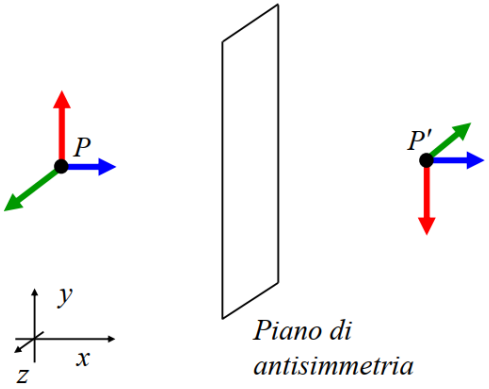
Relazioni di antisimmetria sulle tensioni tangenziali



$$\tau_{xy}(P) = \tau_{xy}(P')$$
$$\tau_{yz}(P) = -\tau_{yz}(P')$$
$$\tau_{xz}(P) = \tau_{xz}(P')$$
$$\Rightarrow$$
$$\tau_{yz}(\text{sul piano}) = 0$$

*Riferimento: http://people.unipi.it/static/ciro.santus/Didattica.html

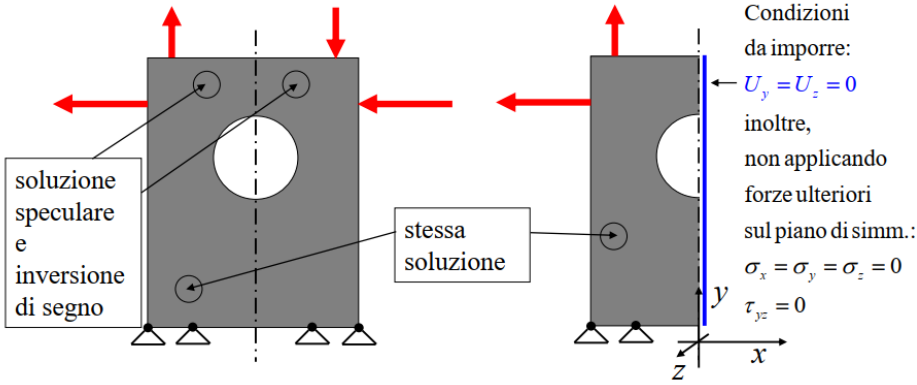
Relazioni di antisimmetria sugli spostamenti



$$U_x(P) = U_x(P')$$
$$U_y(P) = -U_y(P')$$
$$U_z(P) = -U_z(P')$$
$$\Rightarrow$$
$$U_y(\text{sul piano}) = 0$$
$$U_z(\text{sul piano}) = 0$$

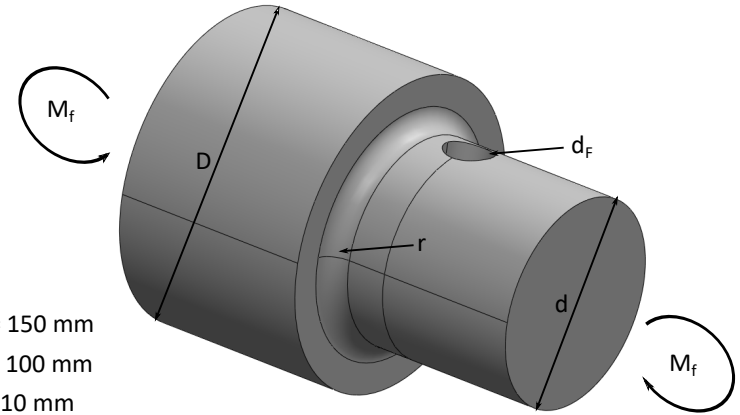
*Riferimento: http://people.unipi.it/static/ciro.santus/Didattica.html

Modellazione equivalente



*Riferimento: http://people.unipi.it/static/ciro.santus/Didattica.html

Determinazione del K_t



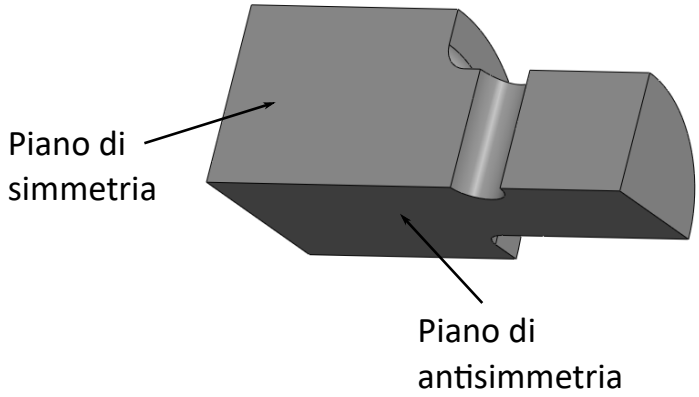
D = 150 mm

d = 100 mm

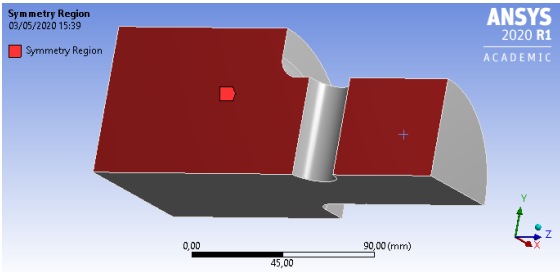
r = 10 mm

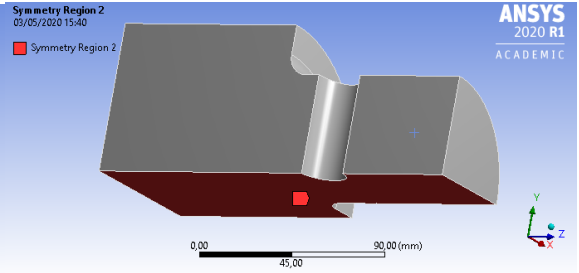
d_F = 12 mm

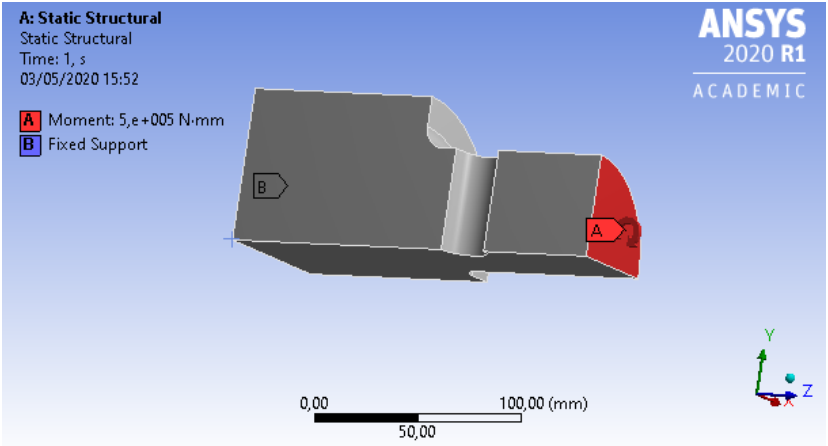
Possibilità di utilizzare delle simmetrie



Utilizzo di simmetria e antisimmetria per ridurre l'onere computazionale del problema.







N.B: In questo caso il carico applicato sarà 1/4 rispetto a quello applicato nella realtà, essendo il componente 1/4 di quello reale ($M_f = \frac{M_{fTOT}}{4}$).