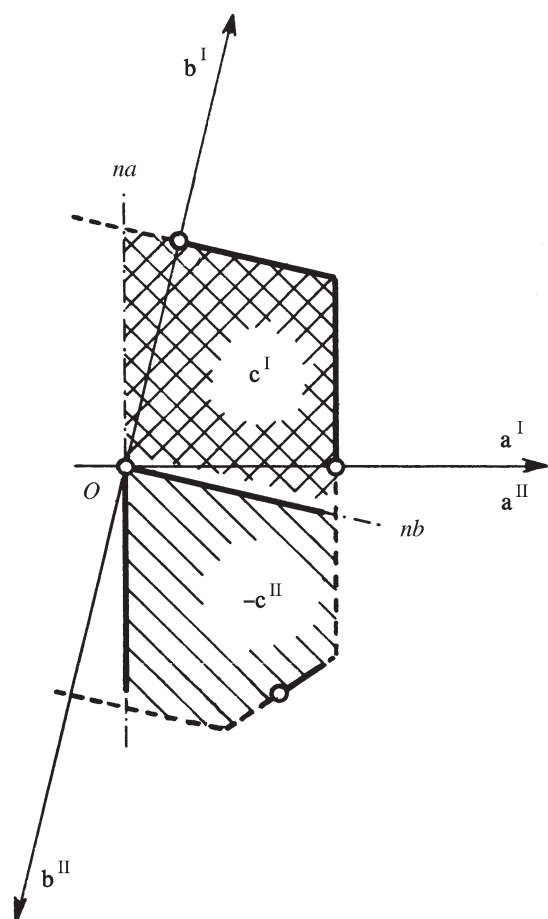


## 3.1. CRYSTAL LATTICES

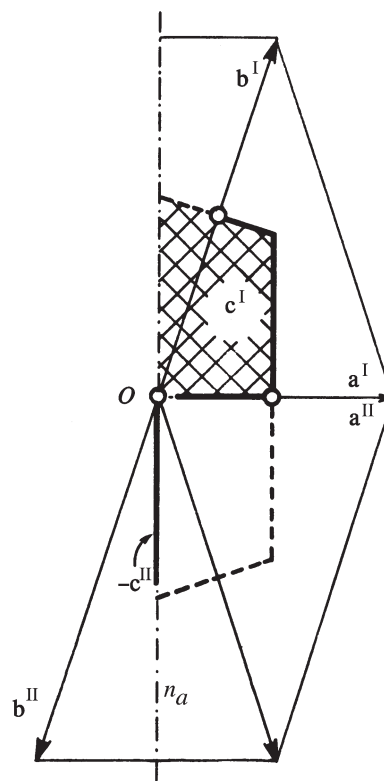

**Figure 3.1.3.3**

The effect of the special conditions. Border lines of type-I and type-II regions are drawn as heavy lines if included. Type-I and type-II regions are marked as in Fig. 3.1.3.1.  $n_b$  belongs to the type-II region. A heavy border line of a region stops short of an end point if the latter is not included in the region to which the border belongs.  $\mathbf{a}$ ,  $\mathbf{b}$  net oblique; special conditions (3.1.3.3c), (3.1.3.3d), (3.1.3.5f).

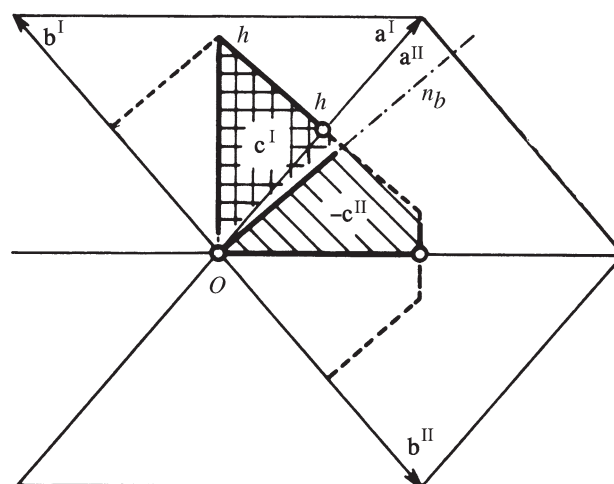
of type I, with basis vectors  $\mathbf{a}^I$ ,  $\mathbf{b}^I$ , and  $OP_0 = +\mathbf{c}$ . Otherwise (hatched area), we have a type-II reduced cell, with  $OP_0 = -\mathbf{c}$  and  $+\mathbf{a}$  and  $+\mathbf{b}$  as shown by  $\mathbf{a}^{II}$  and  $\mathbf{b}^{II}$ .

Since type II includes the case of right angles, the borders of this region on  $n_a$  and  $n_b$  are inclusive. Other borderline cases are points like  $R$  and  $R'$ , separated by  $\mathbf{b}$  and thus describing the same lattice. By condition (3.1.3.5c) the reduced cell for such cases is excluded from type II (except for rectangular  $\mathbf{a}$ ,  $\mathbf{b}$  nets, cf. Fig. 3.1.3.2); so the projection of  $\mathbf{c}$  points to  $R$ , not  $R'$ . Accordingly, this part of the border is inclusive for the type-I region and exclusive (at  $R'$ ) for the type-II region as indicated in Fig. 3.1.3.3. Similarly, (3.1.3.5d) defines which part of the border normal to  $OA$  is inclusive.

The inclusive border is seen to end where it crosses  $OA$ ,  $OB$  or  $OD$ . This is prescribed by the conditions (3.1.3.3d), (3.1.3.3c) and (3.1.3.5f), respectively. The explanation is given in Fig. 3.1.3.1 for (3.1.3.3c): The points  $Q$  and  $Q''$  represent the same lattice because  $Q'$  (diametrically equivalent to  $Q$  as shown before) is separated from  $Q''$  by the vector  $\mathbf{b}$ . Hence, the point  $M$  halfway between  $O$  and  $B$  is a twofold rotation point just like  $O$ . For a primitive orthogonal  $\mathbf{a}$ ,  $\mathbf{b}$  net, only type II occurs according to (3.1.3.5c) and (3.1.3.5d), cf. Fig. 3.1.3.2. A centred orthogonal  $\mathbf{a}$ ,  $\mathbf{b}$  net of elongated character (shortest net vector in a symmetry direction, cf. Section 3.1.3.5) is depicted in Fig. 3.1.3.4. It yields type-I cells except when  $\beta = 90^\circ$  [condition (3.1.3.5c)]. Moreover, (3.1.3.3c) eliminates part of the type-I region as compared to Fig.


**Figure 3.1.3.4**

The effect of the special conditions. Border lines of type-I and type-II regions are drawn as heavy lines if included. The type-I region is cross-hatched; the type-II region is a mere line. A heavy border line of a region stops short of an end point if the latter is not included in the region to which the border belongs.  $\mathbf{a}$ ,  $\mathbf{b}$  net centred orthogonal (elongated); special conditions (3.1.3.3e), (3.1.3.5e).


**Figure 3.1.3.5**

The effect of the special conditions. Border lines of type-I and type-II regions are drawn as heavy lines if included. Type-I and type-II regions are marked as in Fig. 3.1.3.1.  $n_b$  belongs to the type-II region. A heavy border line of a region stops short of an end point if the latter is not included in the region to which the border belongs.  $\mathbf{a}$ ,  $\mathbf{b}$  net centred orthogonal (compressed); special conditions (3.1.3.3a), (3.1.3.5a).

3.1.3.3. Finally, a centred net with compressed character (shortest two net vectors equal in length) requires criteria allowing unambiguous designation of  $\mathbf{a}$  and  $\mathbf{b}$ . These are conditions (3.1.3.3a) and (3.1.3.5a), cf. Fig. 3.1.3.5. The simplicity of these bisecting conditions, similar to those for the case  $b = c$  mentioned initially, is apparent from that figure when compared