7
Slip Systems

7.1. Face-Centered Cubic

Slip occurs on {111} planes (close packed planes) along <110> directions (close packed directions). There are 4 octahedral planes (111), (1$\bar{1}$1), (11$\bar{1}$) and ($\bar{1}$11), 6 <110> directions in each octahedral plane. Each of the directions is common to two octahedral planes, resulting in a total of 12 slip systems. Slip is also possible on (100) along <10$\bar{1}$>. The number of independent slip systems is 12. Slip is illustrated in Figures 7.1 and 7.2.

7.2. Body-Centered Cubic

Slip in BCC occurs on {110} planes (close packed planes), {112} and {123}. Slip direction is <111> (close packed directions).

{110}: There are 12 possible {110} type planes, and for each one there are four slip directions: [1$\bar{1}$1], [$\bar{1}$11], [$\bar{1}$1$\bar{1}$], and [1 $\bar{1}$1]. There are 48 possible combinations of slip plane and slip direction.

{112}: There are 24 possible {112} planes, and for each there are 2 slip directions: [$\bar{1}$1$\bar{1}$] and [11$\bar{1}$]. There are 48 possible combinations of slip plane and slip direction.

{123}: There are 48 possible planes, and for each there are 2 possible slip directions: [$\bar{1}$1$\bar{1}$] and [11$\bar{1}$]. There are 96 possible combinations of slip plane and slip direction.

Slip is illustrated in Figures 7.3 and 7.4.

7.3. Hexagonal Close Packed

Pyramidal planes are {hkin}, where n is an integer. Prism type I planes are {h $\bar{h}$00}. Prism type II planes are {hh$\bar{2}$h0}.

Slip [Partridge] in hcp occurs on the basal, pyramidal I and II, and prism I and II, type planes. Slip occurs along prismatic directions <uu $\bar{2u}$ 0> or pyramidal directions <uu $\bar{2u}$ w> on the basal plane {0001}. In vector form, the slip vectors are **c**, **a**, or **c** + **a**. Slip on the basal plane is similar to slip on the octahedral FCC {111} planes. In Figure 7.5 slip on several planes is shown.

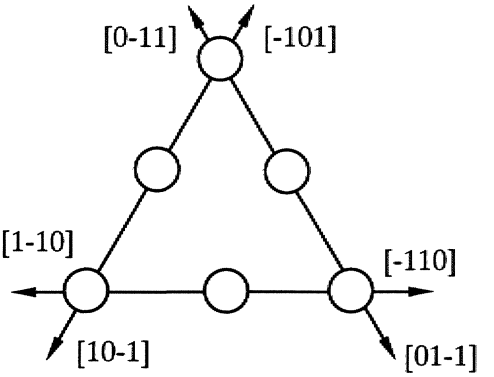

Figure 7.1. FCC slip occurs on close-packed planes in close-packed directions. There are 4 octahedral planes, (111), $(1\bar{1}1)$, $(11\bar{1})$, and $(\bar{1}11)$, six <110> directions, each one common to two octahedral planes, giving 12 slip systems.

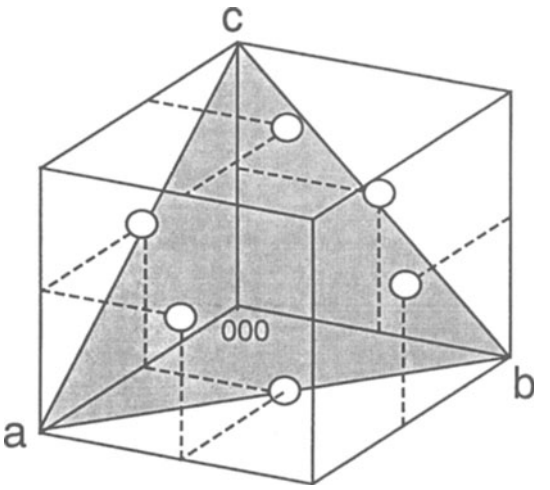

Figure 7.2. The (111) plane in the FCC system is shown shaded.