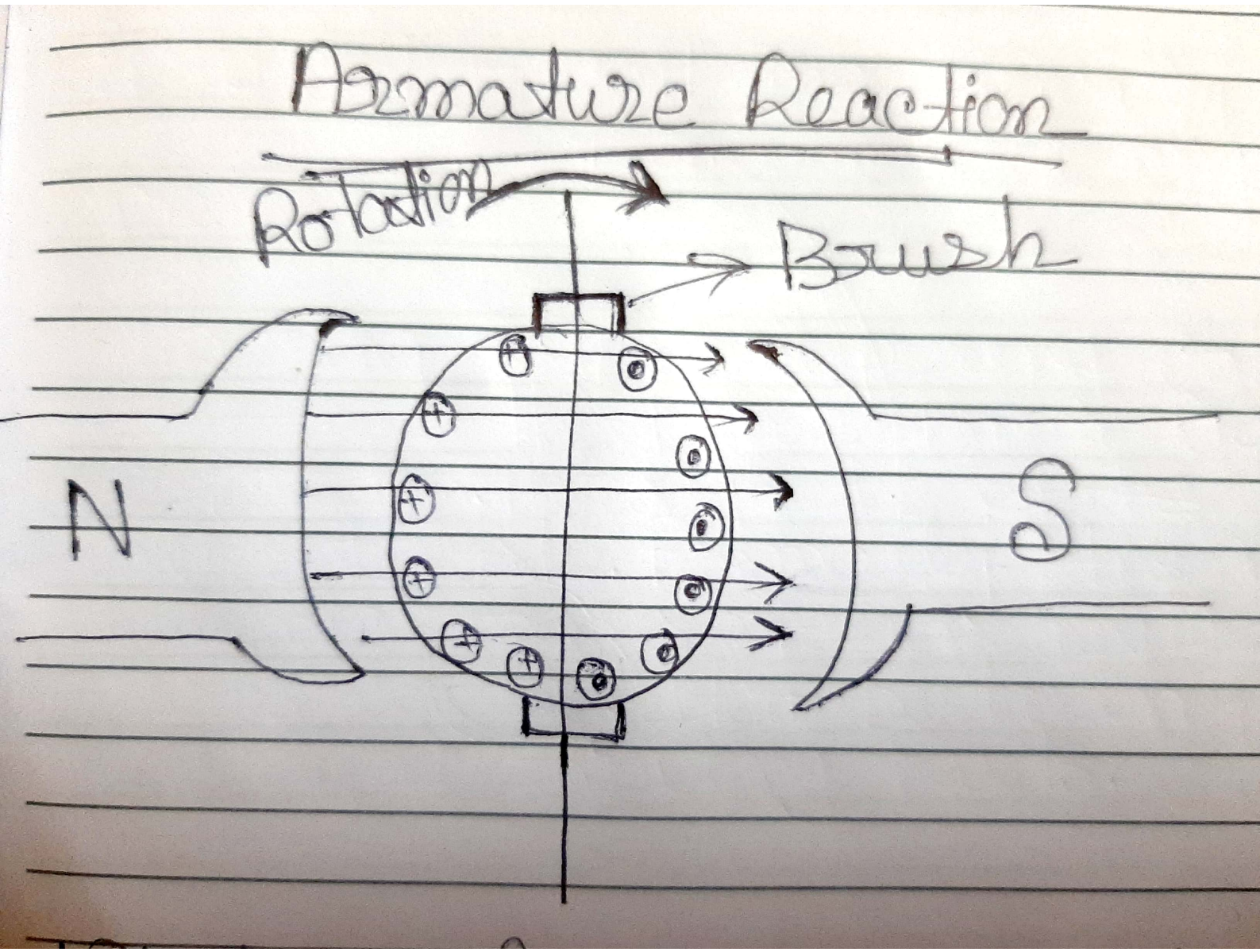
# Armature Reaction

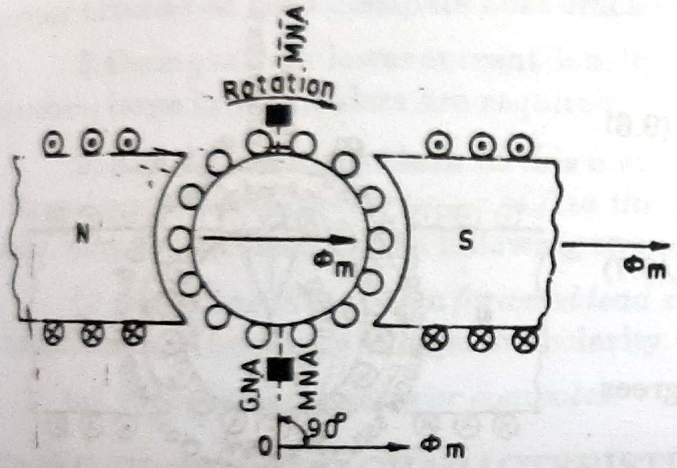


## 9.7. ARMATURE REACTION

— When a machine operates at *no-load*, there exists in it only the m.m.f. of the main poles which creates the *main flux* $\phi_m$, (Fig. 9.8).

— *Under load* when, when a current flows through the armature winding, *an m.m.f. appears (which creates* $\phi_A$*) that interacts with the main m.m.f.* (Fig. 9.9). Hence the magnetic flux $\phi_R$ that exists in a machine when it operates under load should be considered as the *resultant flux* created by the resultant m.m.f. (Fig. 9.10).

*"The action of the armature m.m.f. on the main m.m.f. is termed as armature reaction".*




G.N.A.—Geometrical Neutral Axis or plane

M.N.A.—Magnetic Neutral Axis or plane

*Fig. 9.8. Flux produced by main field of a generator.*

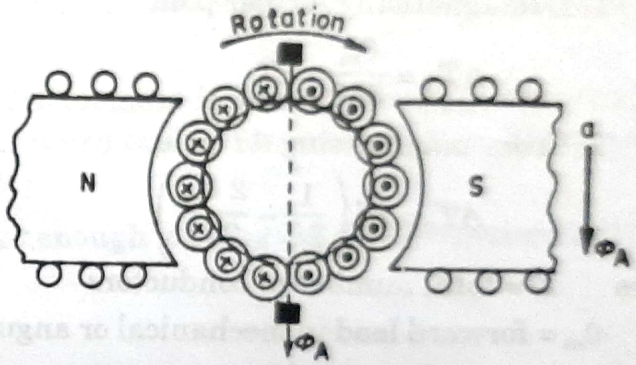



*Fig. 9.9. Flux produced by current in armature conductors.*

The effects of armature flux may be analysed by considering the flux to consists of *two components* that are at right angles to each other as shown in Fig. 9.11. These components are :

(*i*) **Cross-magnetising or distorting component.** This component is at right angles to the main field, because this component *crosses the main field* flux, it is known as the *cross-magnetising component of the armature flux.*

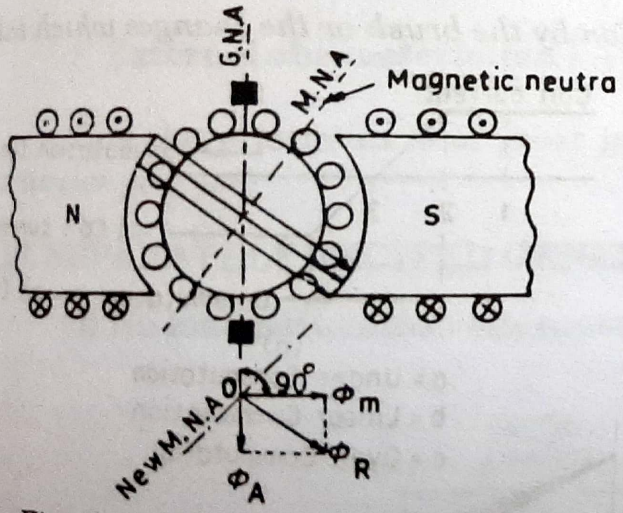



*Fig. 9.10. Shift of generator flux due to armature flux.*

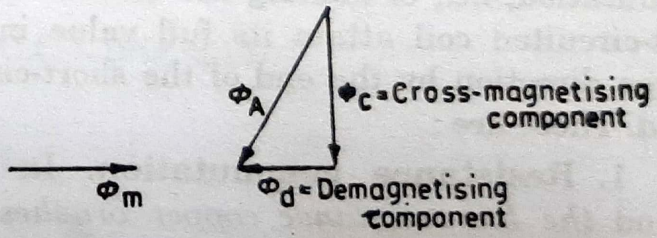



*Fig. 9.11. Components of armature flux and their relative position with respect to main field flux.*

(*ii*) **Demagnetising component.** This component is in the same plane as the main-field flux. The direction of this component is *opposite to the direction of the main field flux,* with the result it *tends to reduce the effect of the maintained flux.*

It may be noted that both cross-magnetising (or distorting) and demagnetising effects *will increase with increase in the armature current.*