It a given rate, v. an undercooling,

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It will be assumed that the simplest morphology for solid/liquid interface (regular, lamellar eutectic.) in order to determine the growth behavior of eutectic phase. As shown in Fig (7) only half of a lamellae of each phase need be considered.

The figure shows an eutectic phase diagram and a regular lamellar two-phase eutectic morphology growing unidirctionally in a positive temperature gradient. The a and /? lamellae grow side by side and are perpendicular to the solid/liquid interface. In order to drive the growth front at a given rate, V. an undercooling, DT, is necessary. Due to the perfection and symmetry of the regular structures, only a small volume element of width, A/2, need be considered in order to characterize the behavior of the whole interface under steady-state conditions. In order to understand the eutectic solidification, it is necessary that the mass transfer associated with heat extraction of solidification. The two phases of eutectic have different composition and the melt have another composition which is the eutectic composition, Ce, which is in contrast with the steady state, that the mean composition of the melt must be equal to the solid composition.

This makes it clear that eutectic growth is largely a depend on diffusion and mass transferDuring the growth, the solid phases ?, ? will start to reject solute atoms in the melt Thus, the ?-phase will reject ?-atoms into the melt, while the b-phase will reject A-atoms. If the two phases will grow separately the solute atoms will be rejected to in the direction of growth that will build up a layer of high concentration of solute atom that each phase don’t need it to the growth. This will lead to decrease growth temperature at the interface due to the constitutional undercooling DTc.

But if the two phases growing side by side it. This situation is much more favorable since the solute which is rejected by one phase is needed for the growth of the other. This lead to decrease in the solute build-up ahead of both phases. The diffusion field causes the l -value of the structure to be minimized, and this leads to more rapid growth. There is an opposing effect which arises from the increased energy associated with the increased curvature of the solid/liquid interface as l decreases. The latter can be expressed in terms of a curvature undercooling, DTr, which depresses the liquidus lines of the equilibrium phase diagram as shown. The positive curvature of the solid phases in contact with the liquid arises from the condition of mechanical equilibrium of the interface forces at the three-phase junction.