The maximal smoothing effect of dispersive equations

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In this talk, we discuss some smoothing estimates of the initial value problem for dispersive equations. We consider the initial value problem of the form: $idu/dt + P(D)u = f(t,x)$, and $u(0,x) = u_0(x)$. We will show that, for the maximal smoothing in space-time, it is necessary and sufficient that the principal part of the symbol does not vanish on the unit sphere.