Modeling of junctions for a class of second order models
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The talk is devoted to a study of the "Riemann Problem" for a junction.

The underlying "Second Order " Model was introduced several years ago in Aw-Rascle, SIAP, 2000 ("Resurrection"), in connection with the celebrated ("Requiem ...") paper of Daganzo in 95.
Here, we study the case of a (single) junction for this model. This problem and the wider problem on a network, have been analyzed by several Authors for First Order models, in particular by Hölden -Risebro, Coclitte-Piccoli et al, Herty-Klar et al, and more recently, partially solved by Garavello-Piccoli for second order models.

The solution we will present is constructed in a submitted paper with Herty, again as a first step for the Riemann Problem, with a rule of equal priority at this junction : all the incoming fluxes are equal, or more generally, the incoming flux vector is proportional to a given vector. Some extensions with other criteria, e.g. maximisation of the flux, have already been investigated with Herty and Moutari.

The most striking fact is that there naturally arises a problem of homogenization : in particular, when there are two incoming roads and one outgoing. For instance, think of the "color" as a possible Lagrangian marker (call it w) : initially the cars on each road are unicolor, since this is a Riemann Problem. Now, at any positive time t, there will be a zone on the outgoing road, near the junction, where the "color "of cars will be mixed , which (in the model !) will change the dynamics of the flow on this road and therefore modify the whole solution.

We will describe a couple of examples, as well as some possible extensions.