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Equation level matching: An extension of the method of matched asymptotic expansion for problems of wave propagation[1] LUIZ FARIA, RODOLFO ROSALES, MIT — We introduce an alternative to the method of matched asymptotic expansions. In the "traditional" implementation, approximate solutions, valid in different (but overlapping) regions are matched by using "intermediate" variables. Here we propose to match at the level of the equations involved, via a "uniform expansion" whose equations enfold those of the approximations to be matched. This has the advantage that one does not need to explicitly solve the asymptotic equations to do the matching, which can be quite impossible for some problems. In addition, it allows matching to proceed in certain wave situations where the traditional approach fails because the time behaviors differ (e.g., one of the expansions does not include dissipation). On the other hand, this approach does not provide the fairly explicit approximations resulting from standard matching. In fact, this is not even its aim, which to produce the "simplest" set of equations that capture the behavior.

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