A MOMENT CLOSURE BASED ON PROJECTIONS ON THE BOUNDARY OF THE REALIZABILITY DOMAIN

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ABSTRACT. The method of moments is widely used for the reduction of kinetic models. It consists in integrating the kinetic equations against a set of basis functions. However, the resulting system of moment equations is generally underdetermined and requires additional closing equations. One possibility to define such a closure consists in reconstructing an underlying kinetic distribution from the moments, and to expressing the closure based on this reconstructed function. Such reconstructions are not unique, and we may choose one with particular properties. However, imposing additional constraints to this reconstruction, such as the positivity of the distribution, also corresponds to imposing that the moments evolve in a certain set, so-called realizability domain. This work focuses on the geometry of the realizability domain, and especially on its boundary. Then, a method to construct realizable closures is proposed using a particular choice of projections onto the boundary of the realizability domain.

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