

# Young Duality of Variational Inequalities. An Application for the Analysis of Interactions in Production Networks

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**Abstract**—We develop a mathematical technique of Young dual variational inequalities, which are used to model market equilibrium in a network of production clusters that are heterogeneous from a technological point of view. Two formulations of the problem are considered: for a closed system with a given constraint on resources and for an open system in which resources can be supplied from outside at given prices. A theorem is proved on the existence of a solution to the variational inequality corresponding to market equilibrium in an open system.

**Keywords:** production network, heterogeneity, variational inequality, Young duality, market equilibrium, resource allocation problem.

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