ON THE DYNAMIC CONTROL OF MATCHING QUEUES

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We consider the optimal control of matching queues with dynamically arriving jobs. The objective is to minimize cumulative job holding costs over a finite time horizon. In the special case of linear (and equal across classes) holding costs, this is equivalent to maximizing the number of matched jobs. We introduce a multi-dimensional imbalance process that captures the number of additional jobs required so that some control policy could have matched all jobs that have arrived by that time (thus leaving all queues empty). The imbalance process facilitates the construction of a lower bound. Under a so-called match-pooling condition, we devise a discrete-review matching policy that asymptotically – as the arrival rates become large – achieves the imbalance-based lower bound.