Representation of the Snell envelope as the future supremum process

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On the finite time interval [0, T] we consider the class (D) of right continuous (with left limits) processes and for each element X of (D) its Snell envelope Y, that is the smallest supermartingale bounding X from above. We establish that Y is indistinguishable from the so-called future supremum of the process (X-M), where M is the martingale part in the Doob-Meyer decomposition of the Snell envelope Y. From the latter result, as a direct consequence, we obtain the dual representation of the value of the optimal stopping problem due to Rogers [1].

References.

[1] L.C.G. Rogers, Monte Carlo valuation of American options, Math.Finance, 12 (2002), pp. 271-286.