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Valuing the Guaranteed Minimum Death Benefit Clause with Partial Withdrawals

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Variable annuities	guaranteed minimum death benefit (GMDB)	viscosity solution	impulse control	
fully implicit penalty	r method			

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Notes

 1 Intuitively, this can be viewed as a discretely observed lookback option based on the maximum value of the underlying (Wilmott, <u>1998</u>).

² We remark that our PDE approach can easily be extended to model different withdrawal policies. For example, an alternate withdrawal policy, whereby the deposit is reduced by the amount withdrawn but the death benefit is reduced on a proportional basis, could be easily implemented.



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