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A multisymplectic framework for classical field theory and the calculus of variations. II. Space + time decomposition. (English. English summary)

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This is the second part of a paper by the author [Part I, in Mechanics, analysis and geometry: 200 years after Lagrange, 203–235, North-Holland, Amsterdam, 1991; MR 92c:58023]. The purpose of the paper under review is to demonstrate how the Hamiltonian formalism introduced in the first part may be space-time decomposed. Let $\pi\colon Y \to X$ be a configuration bundle. An infinitesimal slicing is a Cauchy surface $\Sigma \subset X$ along with a π-projectable vector field ζ (the evolution direction) on Y such that $\zeta|_{Y_\Sigma}$ is everywhere transverse to Y_Σ. A choice of ζ gives rise to an identification between $j^r_\Sigma\mathcal{Y} = (j^r\mathcal{Y})_\Sigma$ ($j^r\mathcal{Y}$ being the space of holonomic sections of $J^rY \to X$) and $T^r\mathcal{Y}_\Sigma = J^r(\mathbf{R}, Y_\Sigma)$, the rth order tangent bundle. The idea is to use this identification to construct the instantaneous Lagrangian formalism for a kth order field theory which turns out to be independent of the choice of the Lepagean equivalent. The author also analyzes the reduced symplectic manifold proving that it is isomorphic to $T^*\Gamma(J^{k-1}_\Sigma Y)$ with its standard symplectic structure. *Jaime Muñoz Masqué* (E-CSIC-MS)