Let $c_1(.)$ be an arbitrary function in $L^2(T)$. A consequence of (A.4) is

$$\langle g^{[-1]} \mid w \rangle = -\langle g \mid w_\epsilon \rangle + \langle c_1 \mid w \rangle, \forall w \in \mathcal{W}_{ad} . \tag{A.5}$$

This statement is similar to the Theorem in Ch. 1, § 1.2 of Vladimirov [11]: the only difference is needed to encompass the time dependence of some quantities. Of course every $g^{[-1]}$ of Eq. A.5 satisfies $g^{[-1]} \in L^2(T;\ L^1_{\text{loc}}(D))$. Since antidifferentiation is a set – valued map, the notation $\{ g^{[-1]} \} \subset L^2(T;\ L^1_{\text{loc}}(D))$ is used.

If there exists a representative of the class $\{ g^{[-1]} \}$, which is continuous at x_0^+, the antiderivative of g, which vanishes at x_0^+ is defined and is denoted by $g_0^{[-1]}$.

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