Subtracting internal multiples in the generator domain

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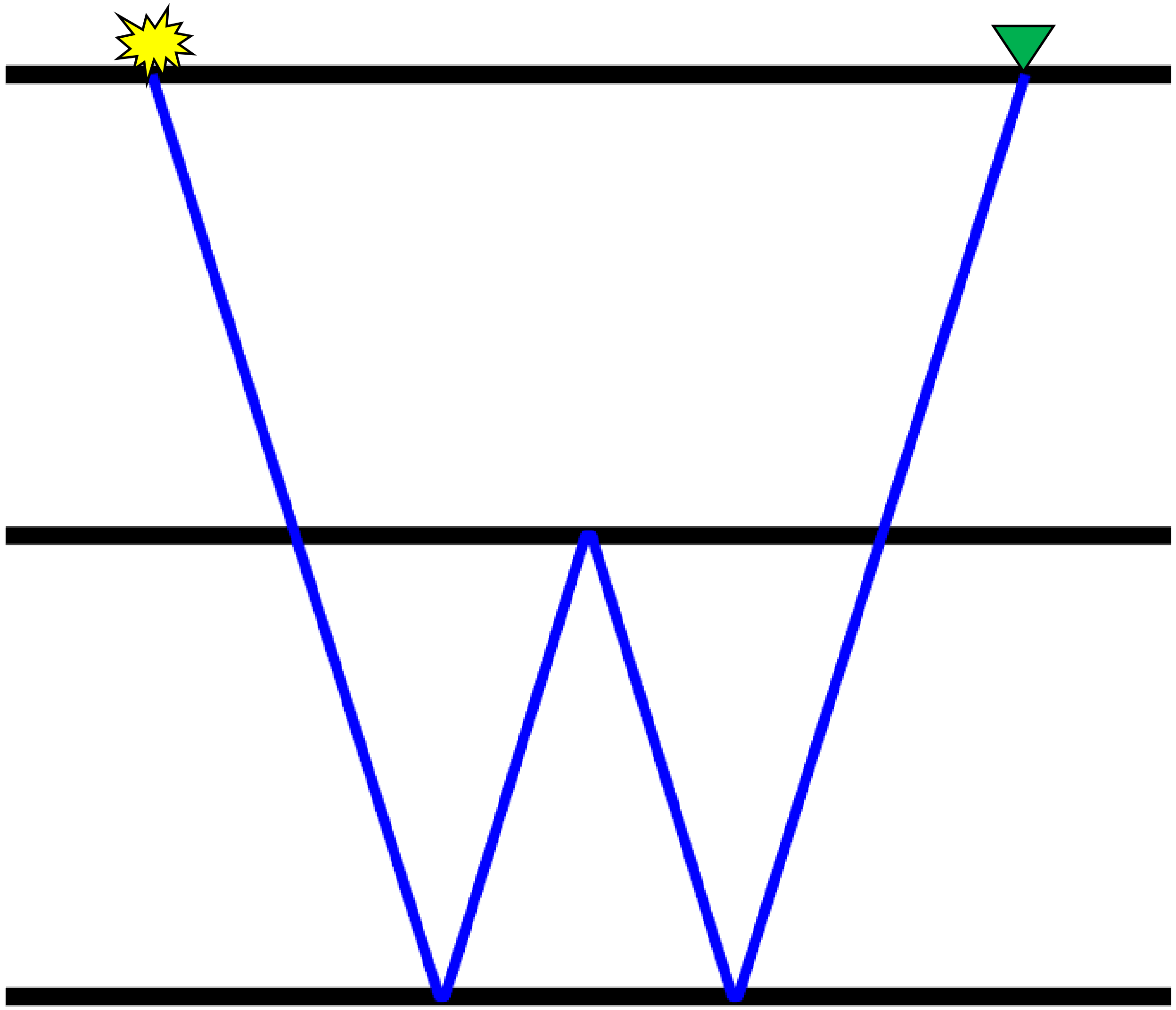
FACULTY OF SCIENCE
Department of Geoscience

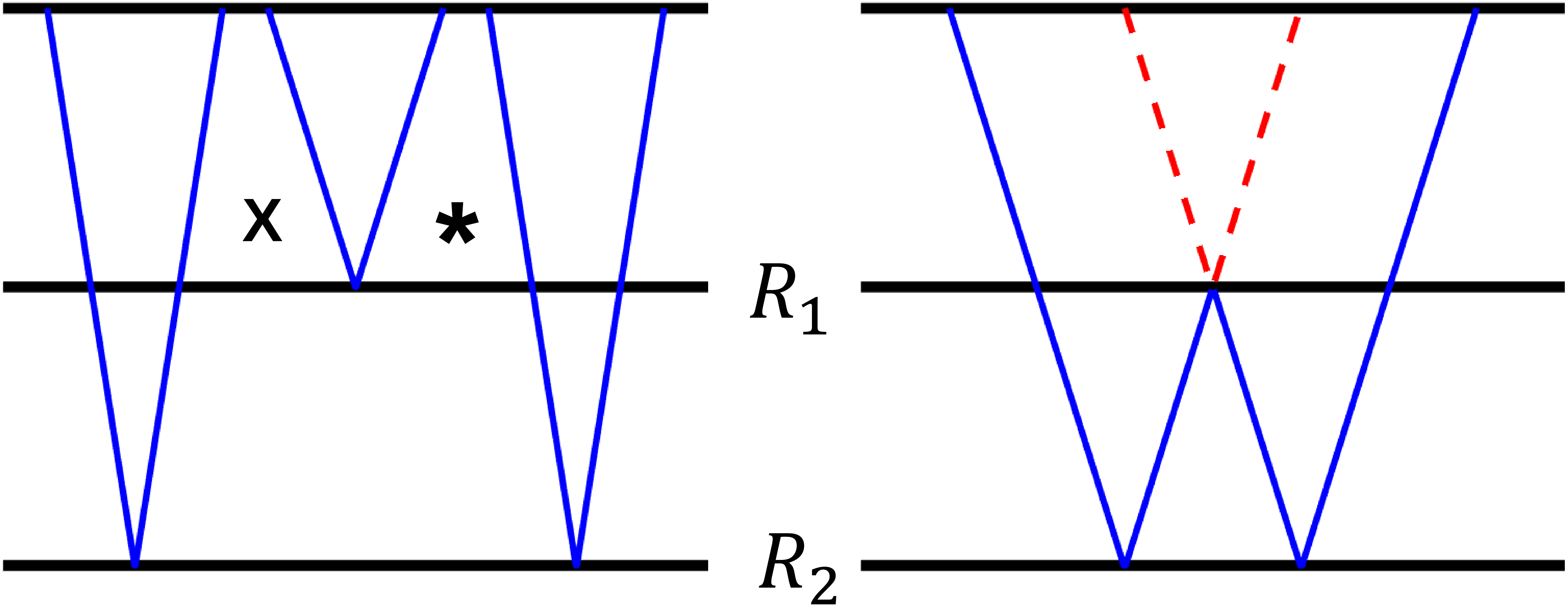
Internal multiples

Events with at least one downward reflection and no surface reflections

Usually harmful in seismic processing and interpretation



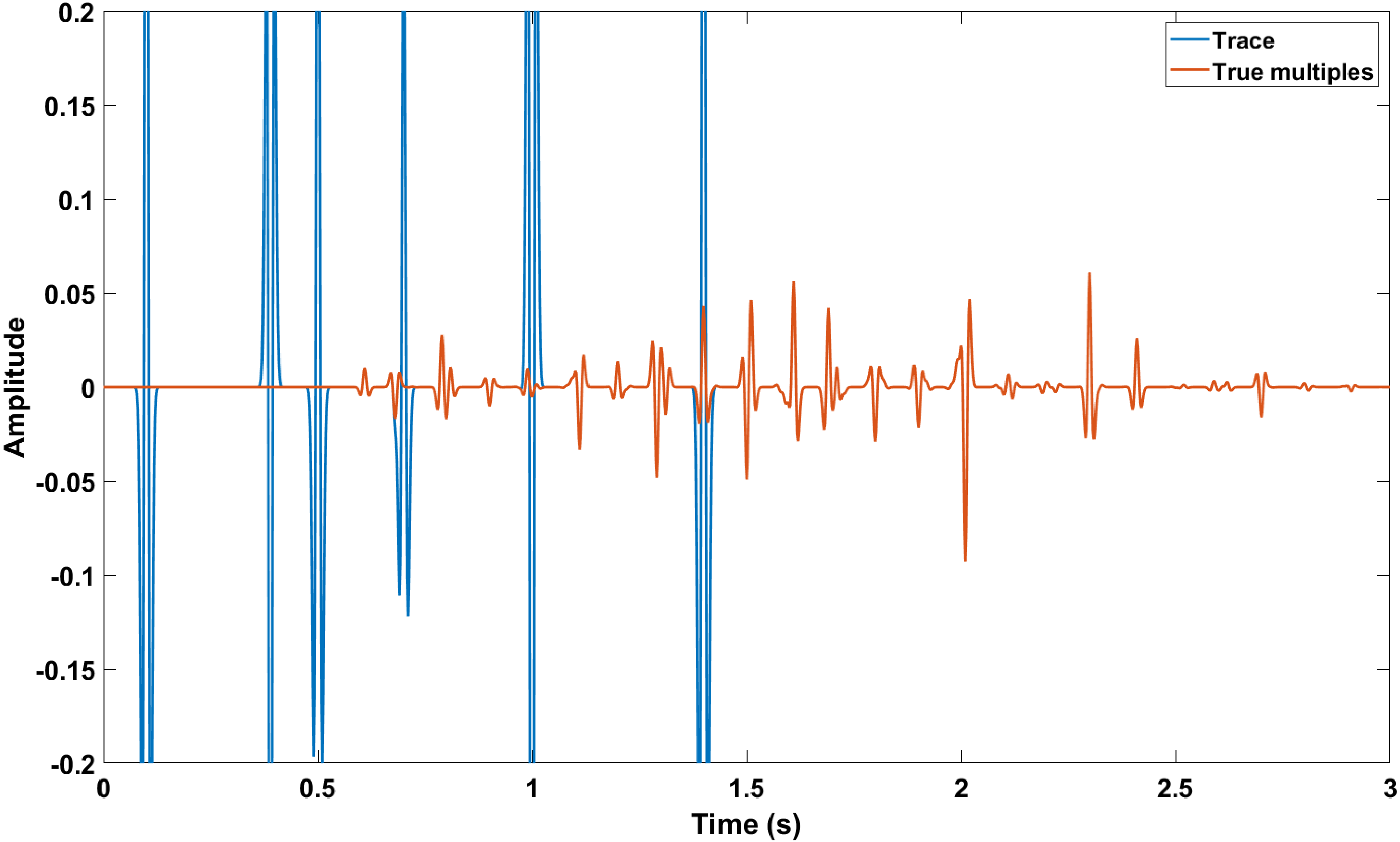
Multiple prediction



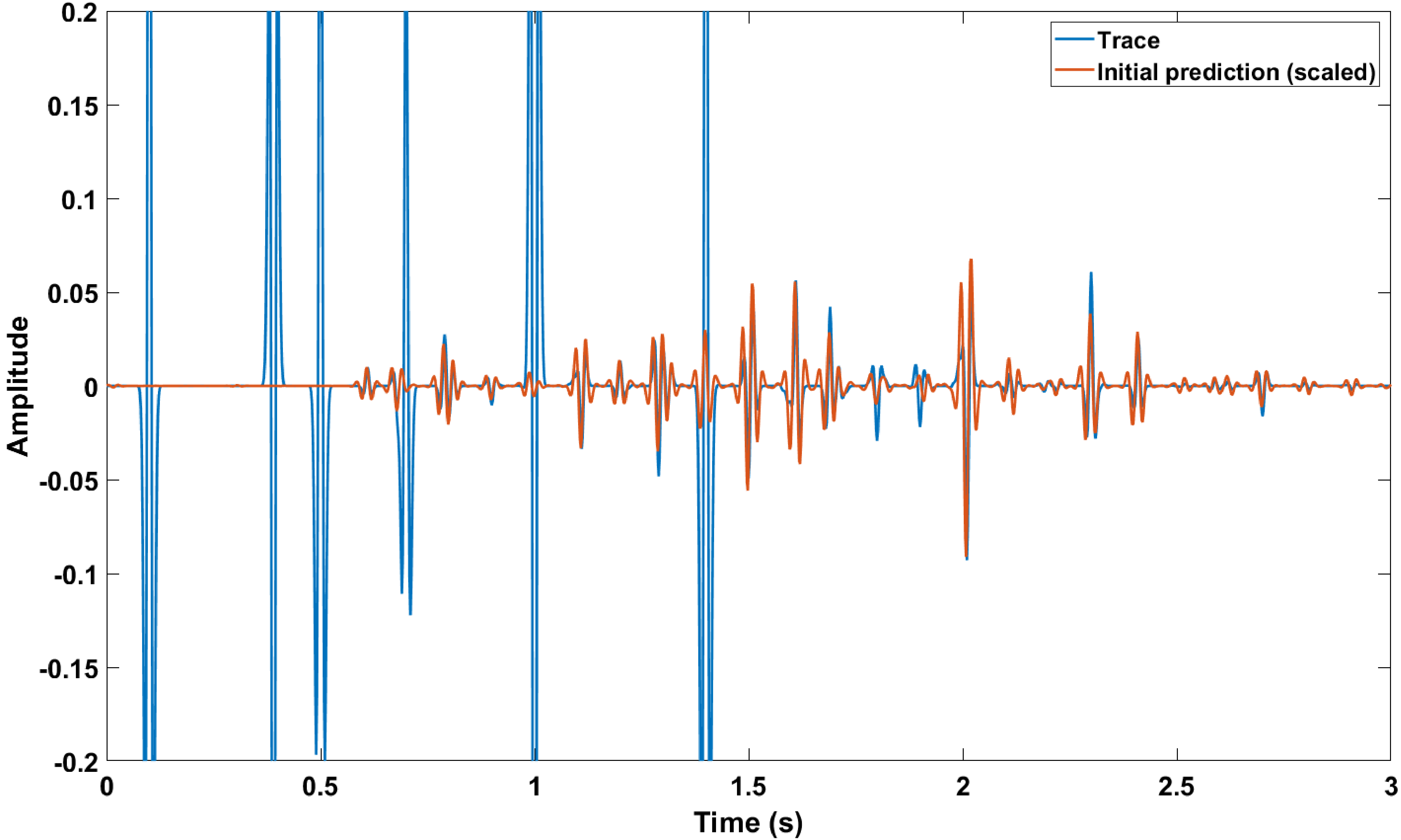
$A_P = -R_2 R_1 R_2$

$A_D = -R_2 R_1 R_2$

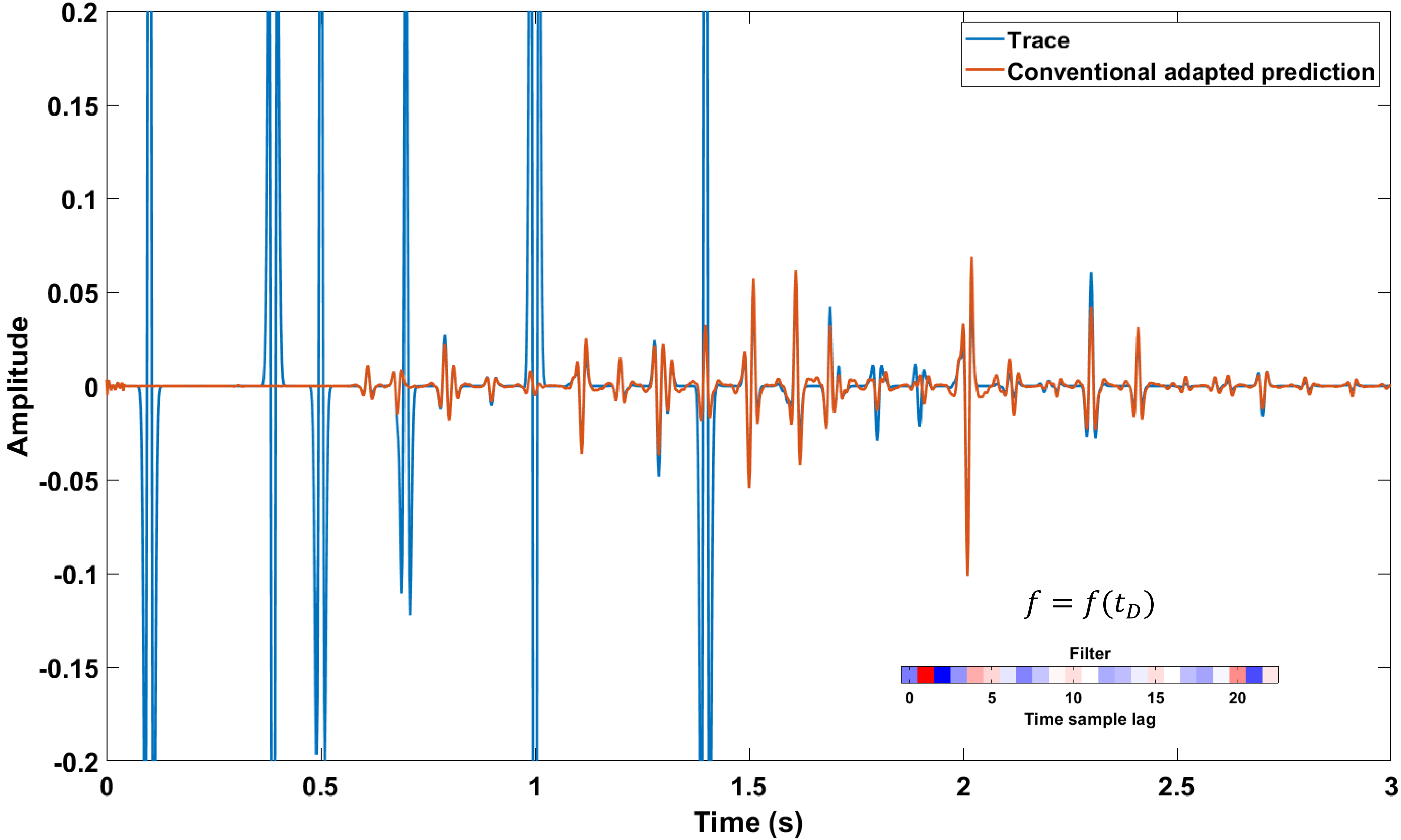
Multiple prediction



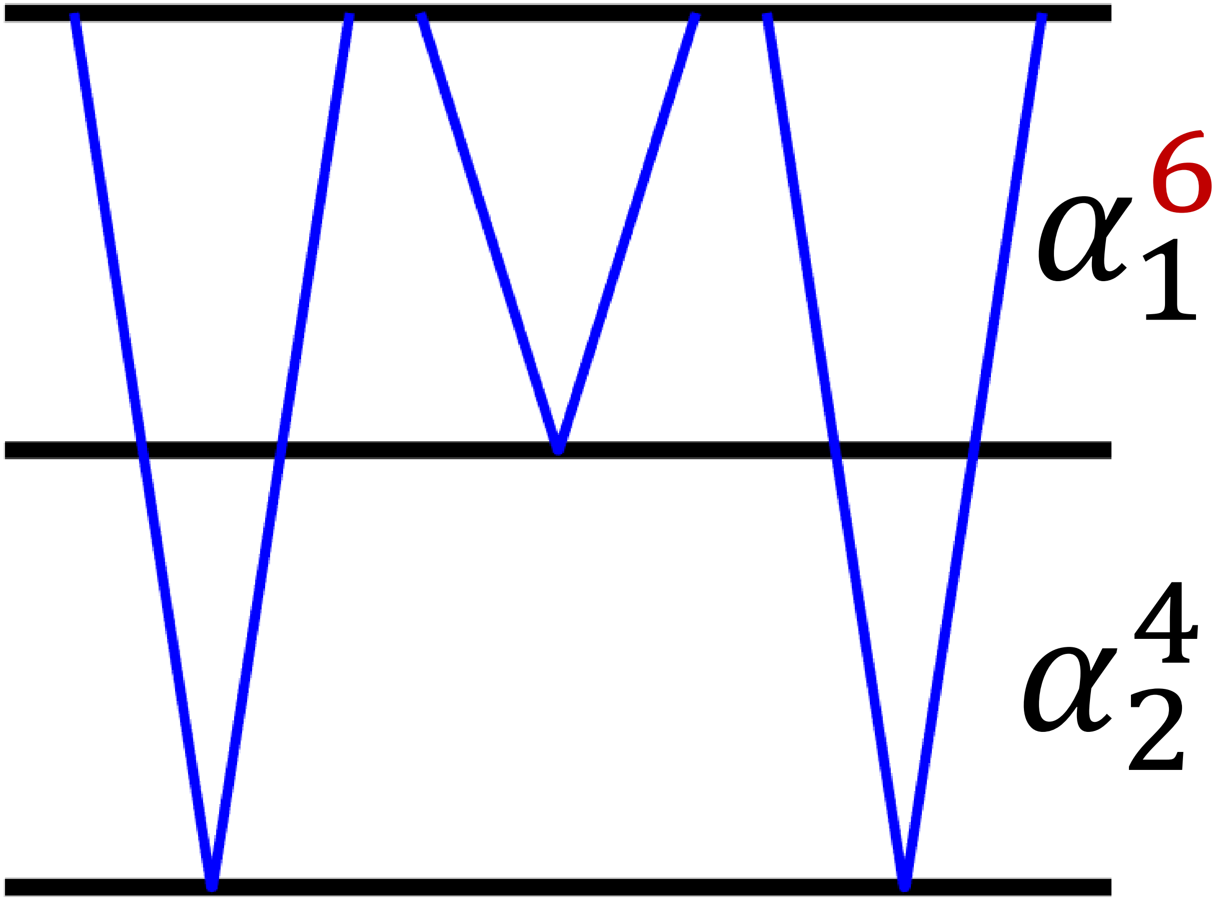
Multiple prediction



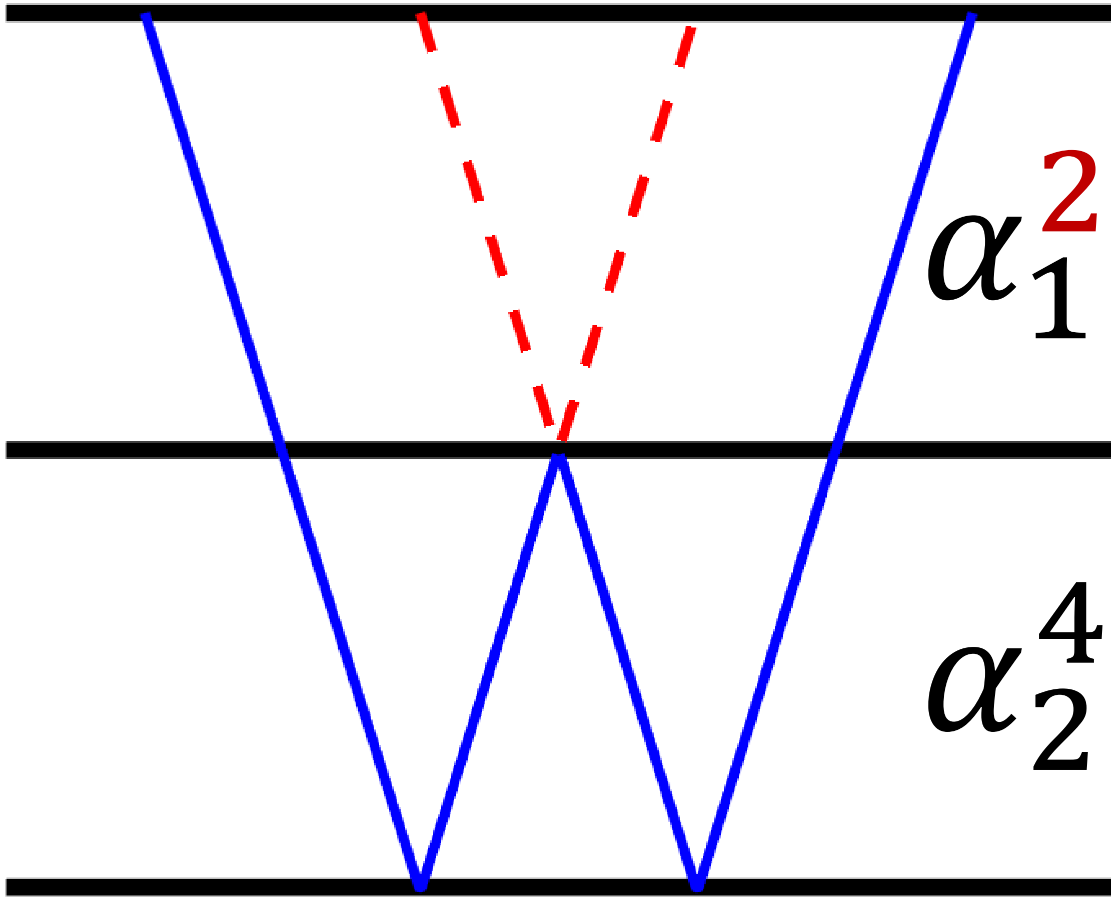
Adaptive subtraction



Multiple-prediction errors

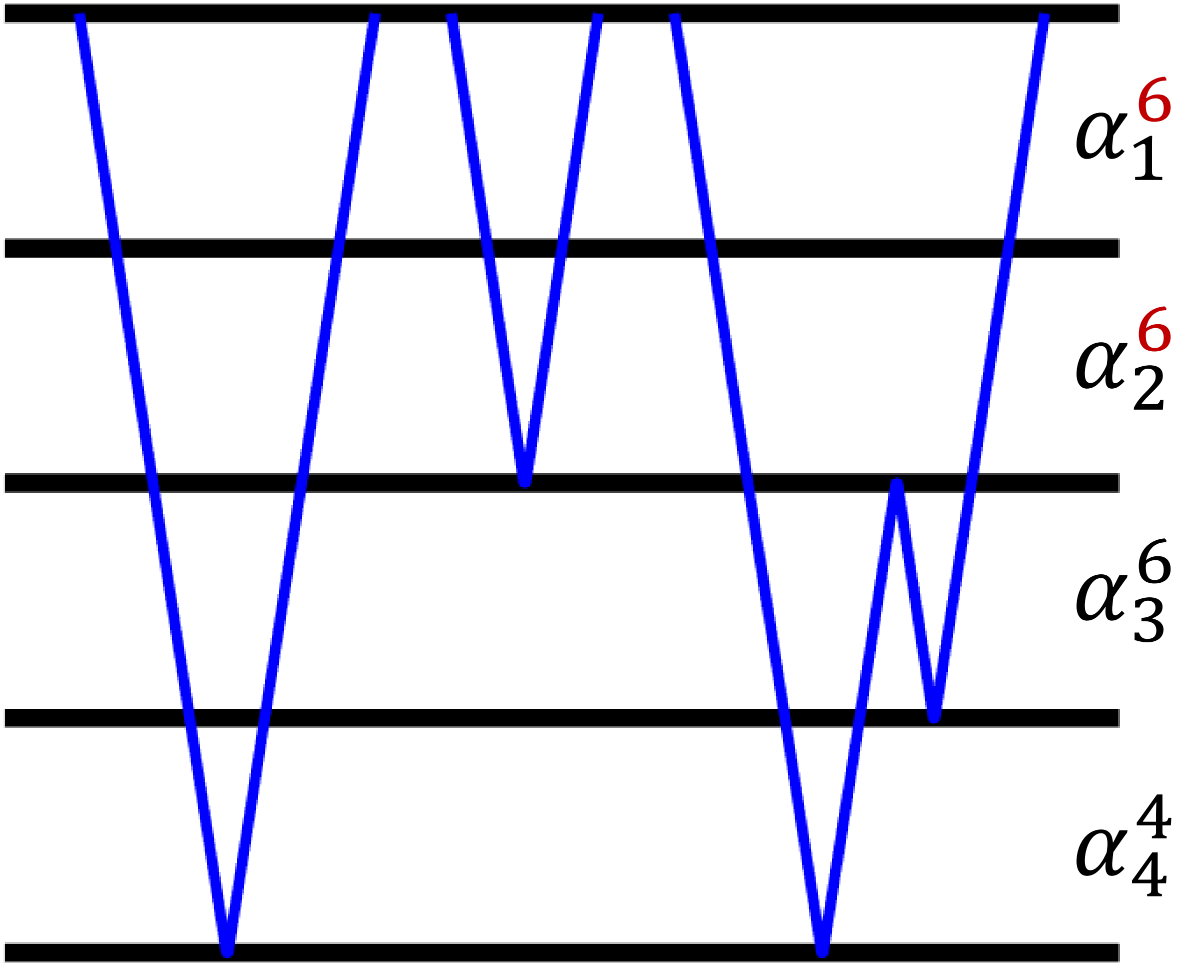

α_1^6
α_2^4

$$A_P = A_0\alpha_1^6\alpha_2^4$$

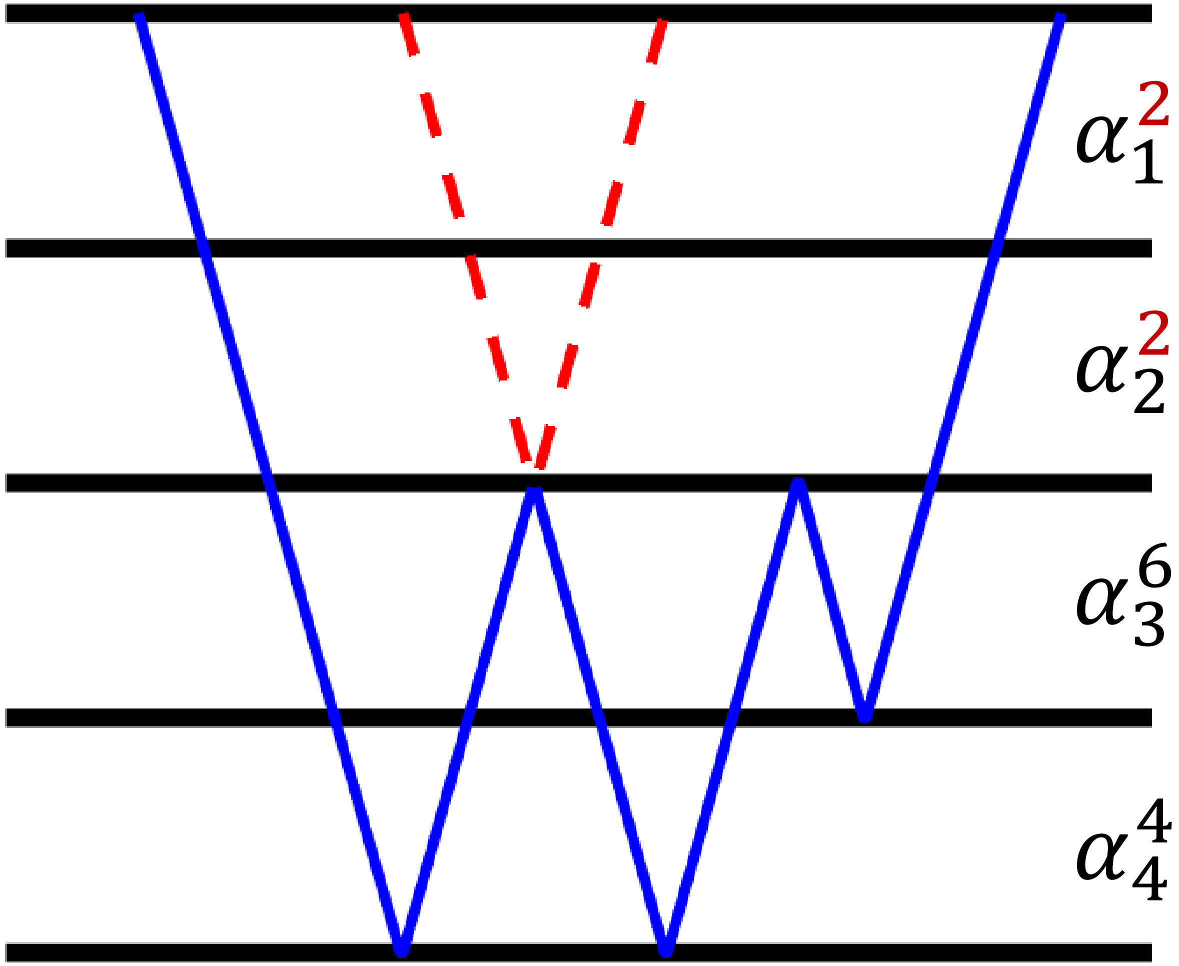

α_1^2
α_2^4

$$A_D = A_0\alpha_1^2\alpha_2^4$$

Multiple-prediction errors

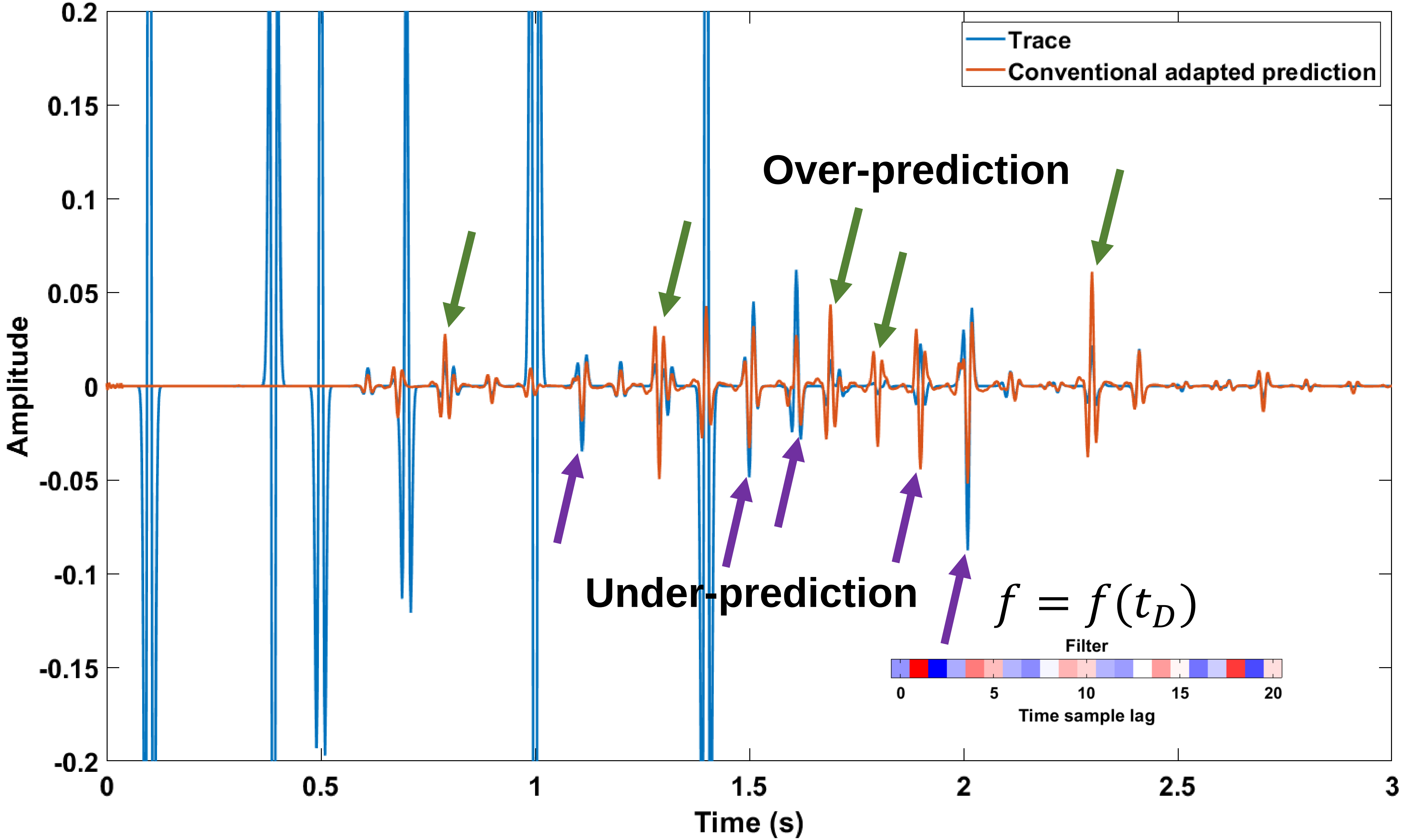

α_1^6
α_2^6
α_3^6
α_4^4

$$A_P = A_0\alpha_1^6\alpha_2^6\alpha_3^6\alpha_4^4$$


α_1^2
α_2^2
α_3^6
α_4^4

$$A_D = A_0\alpha_1^2\alpha_2^2\alpha_3^6\alpha_4^4$$

Multiple-prediction errors



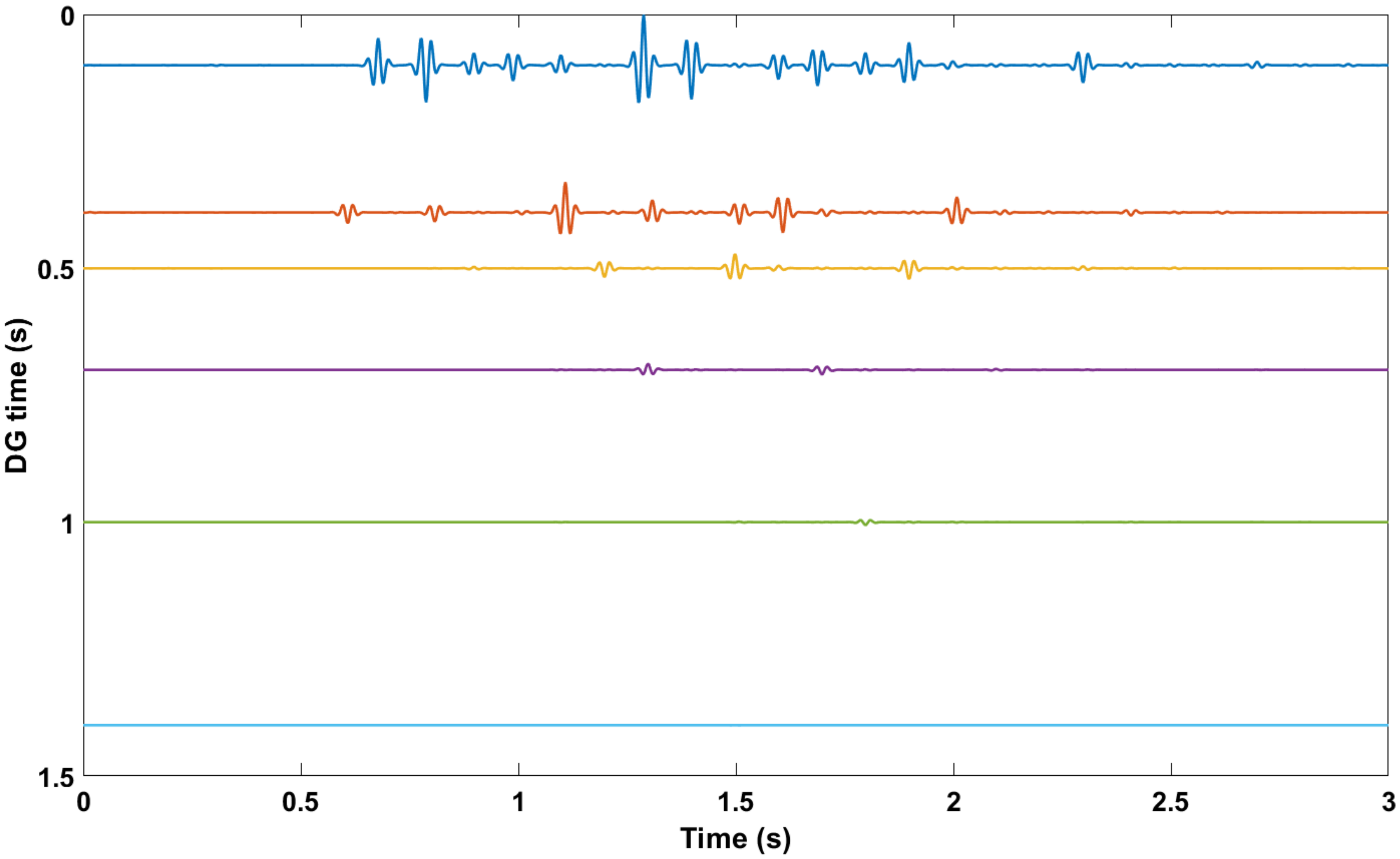
$$f = f(t_D)$$

Multiple-prediction errors

How can we make
these errors consistent
or predictable?

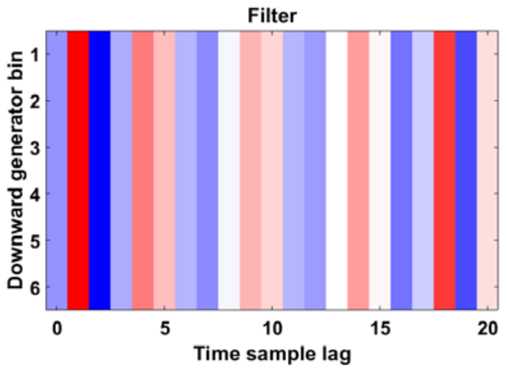
The downward generator domain

Amplitude errors



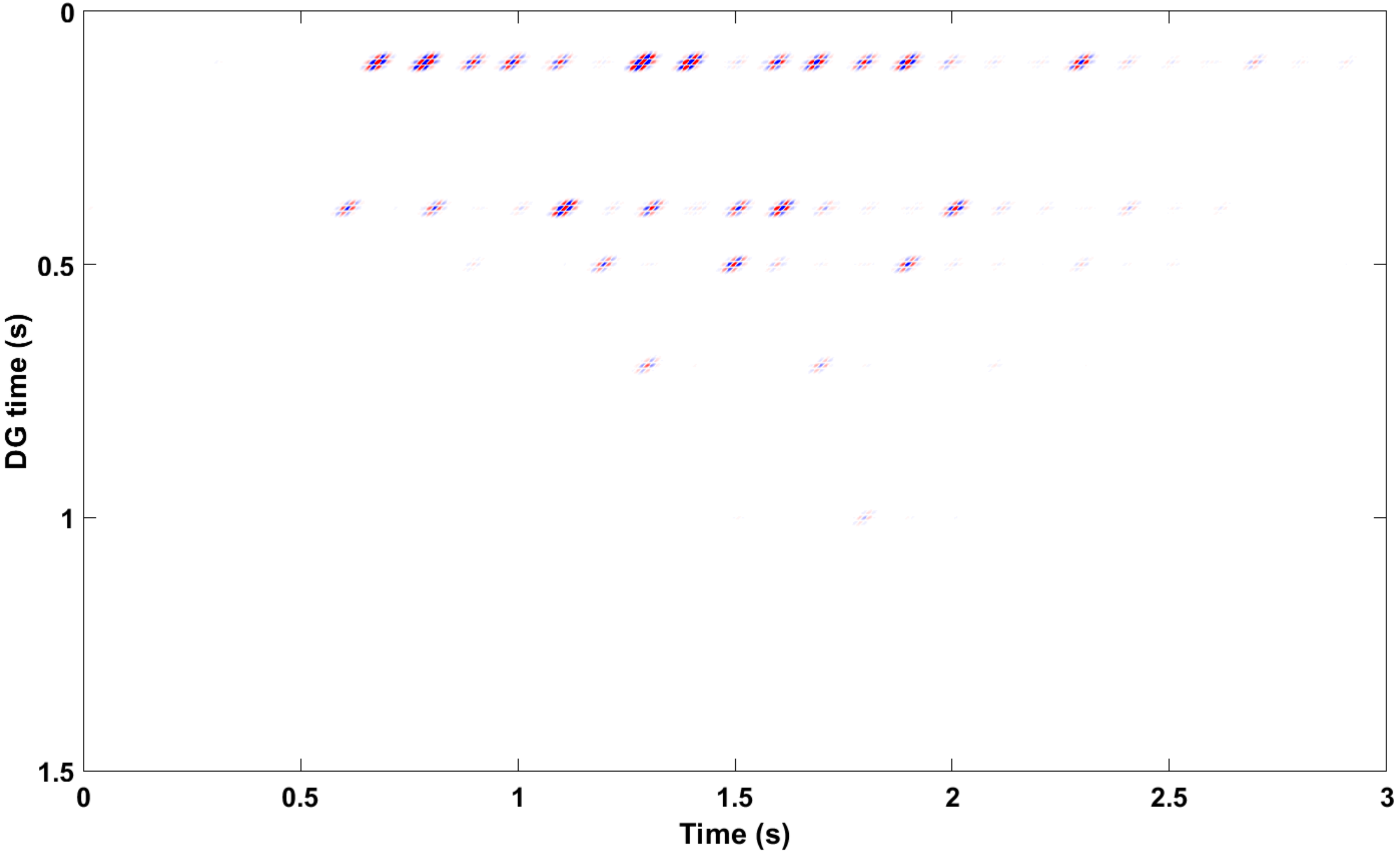
Phase errors

$$f = f(\boldsymbol{t_D})$$



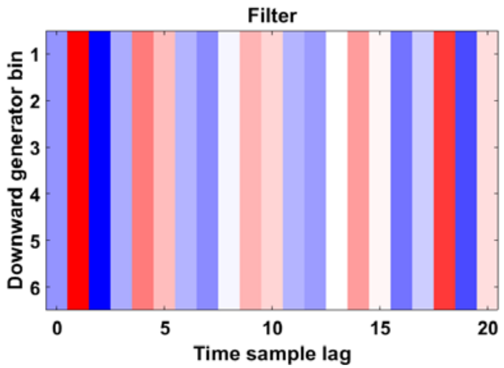
The downward generator domain

Amplitude errors

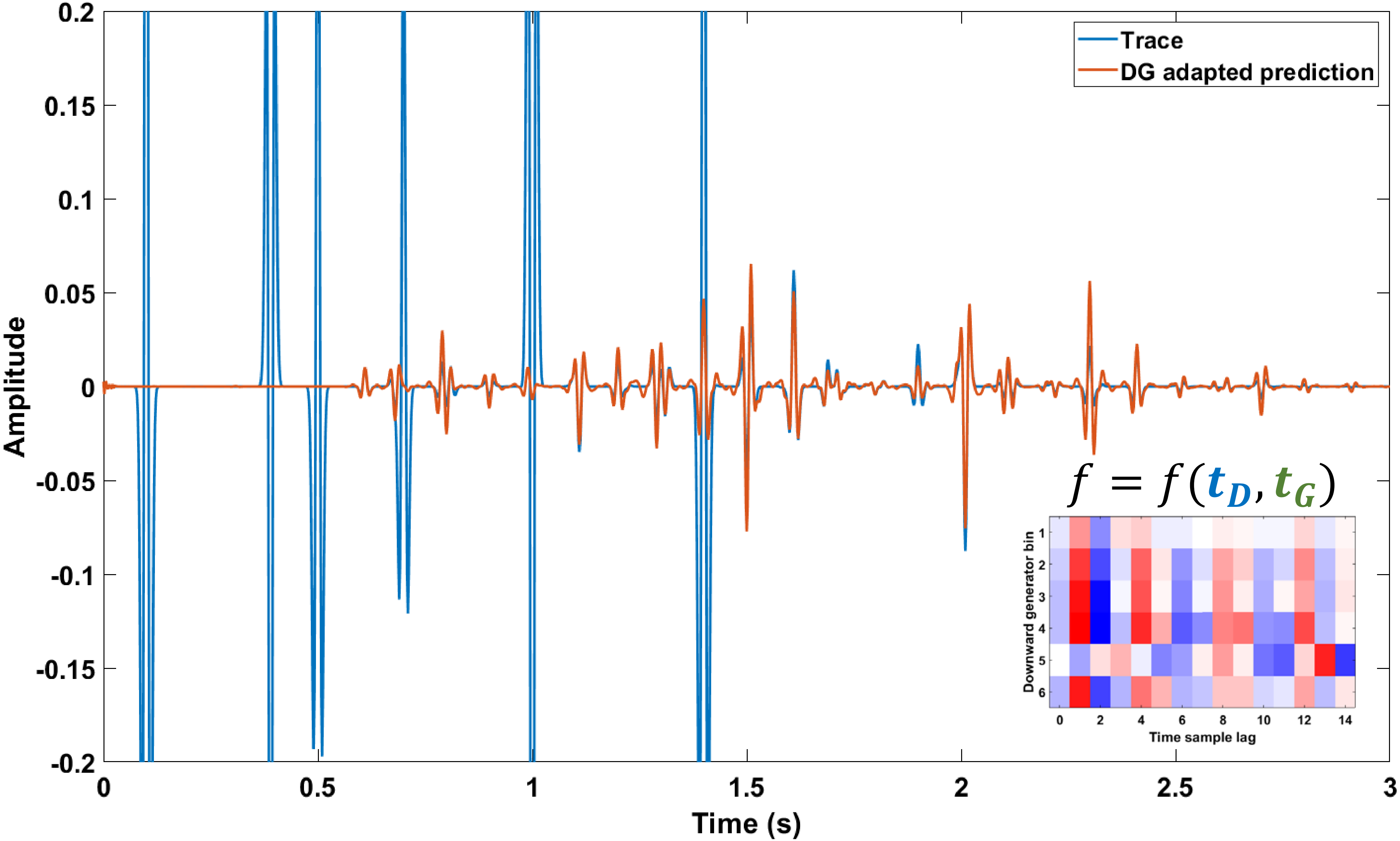


Phase errors

$$f = f(\boldsymbol{t_D})$$

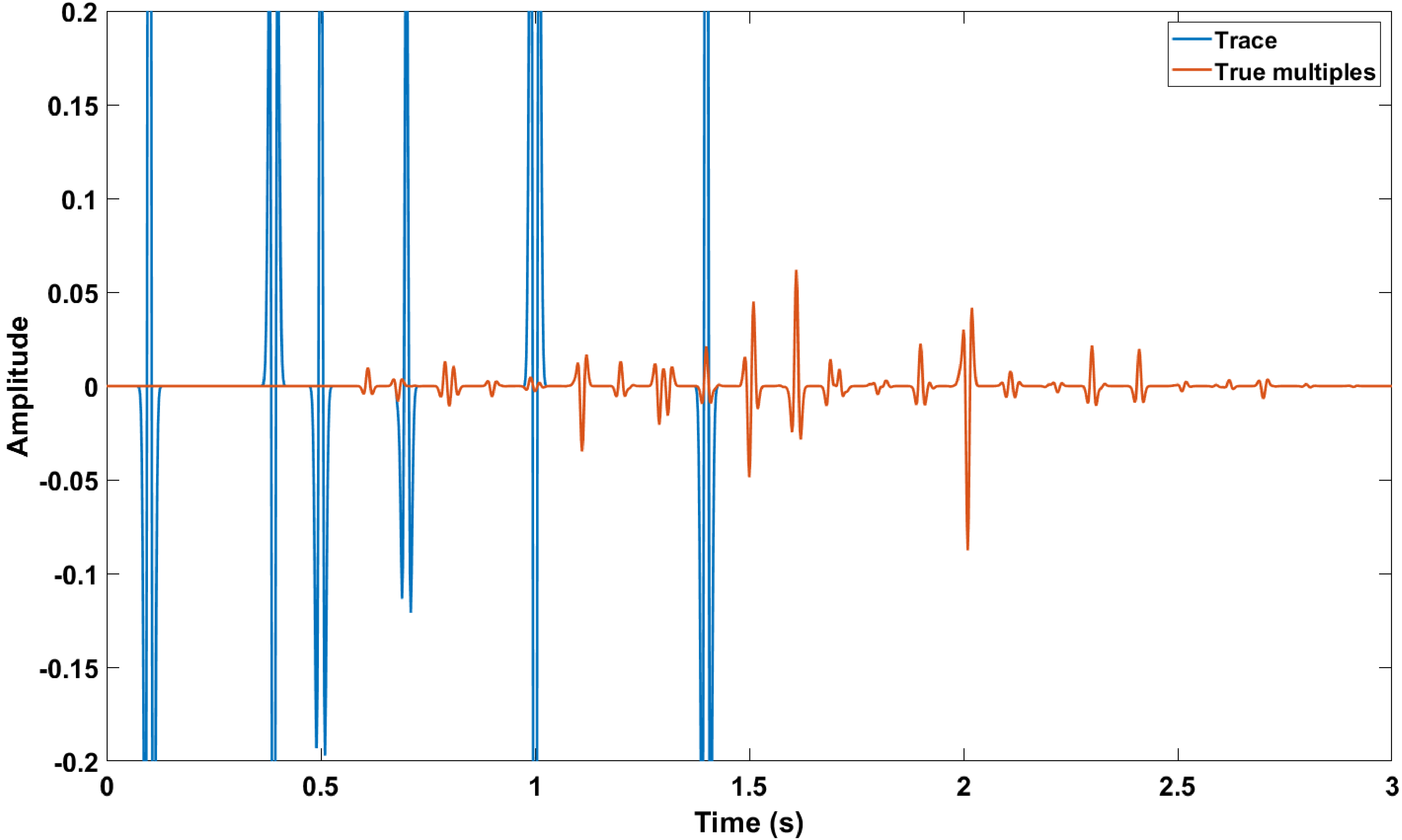


DG-domain adaptive subtraction

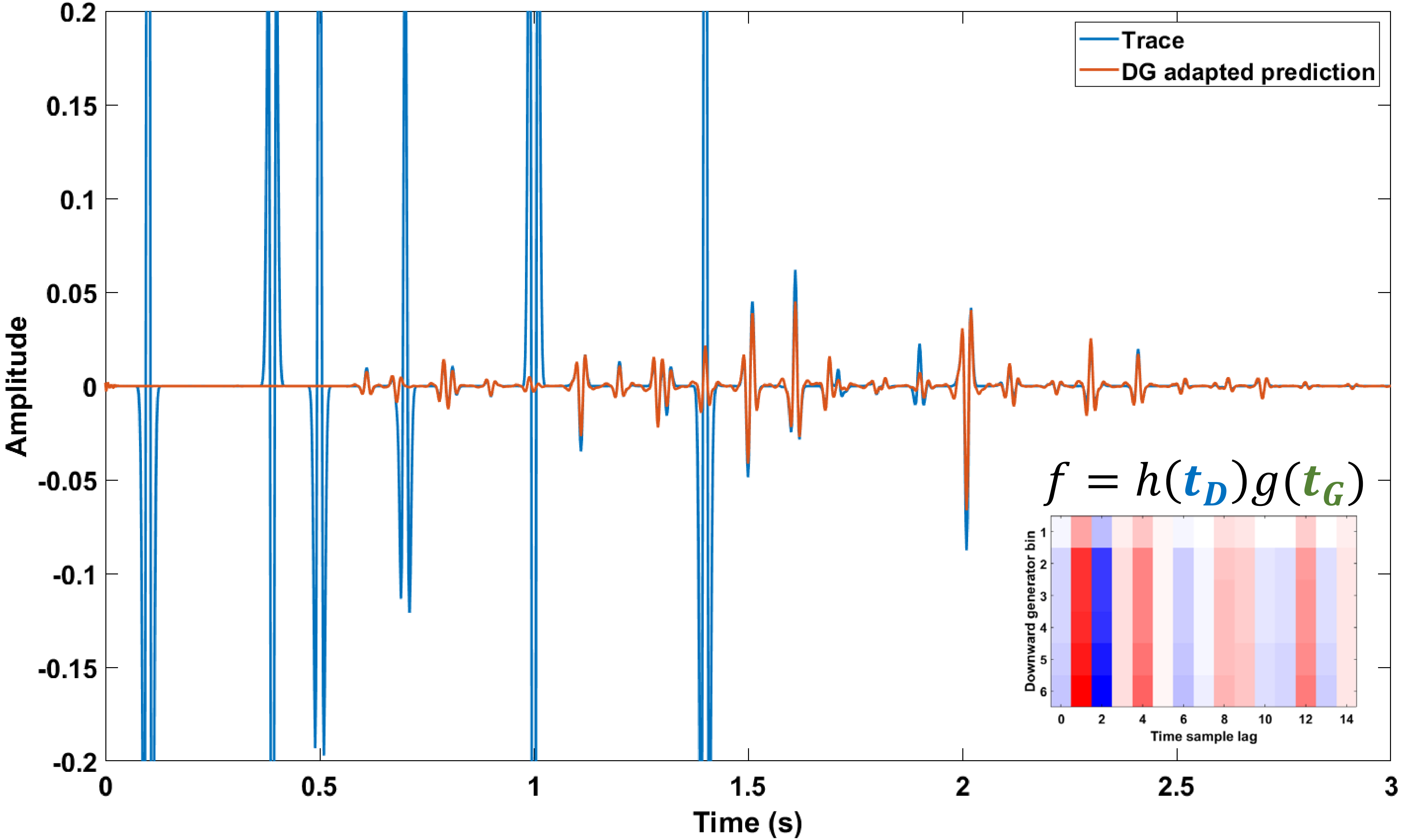


$$f = f(t_D, t_G)$$

DG-domain adaptive subtraction

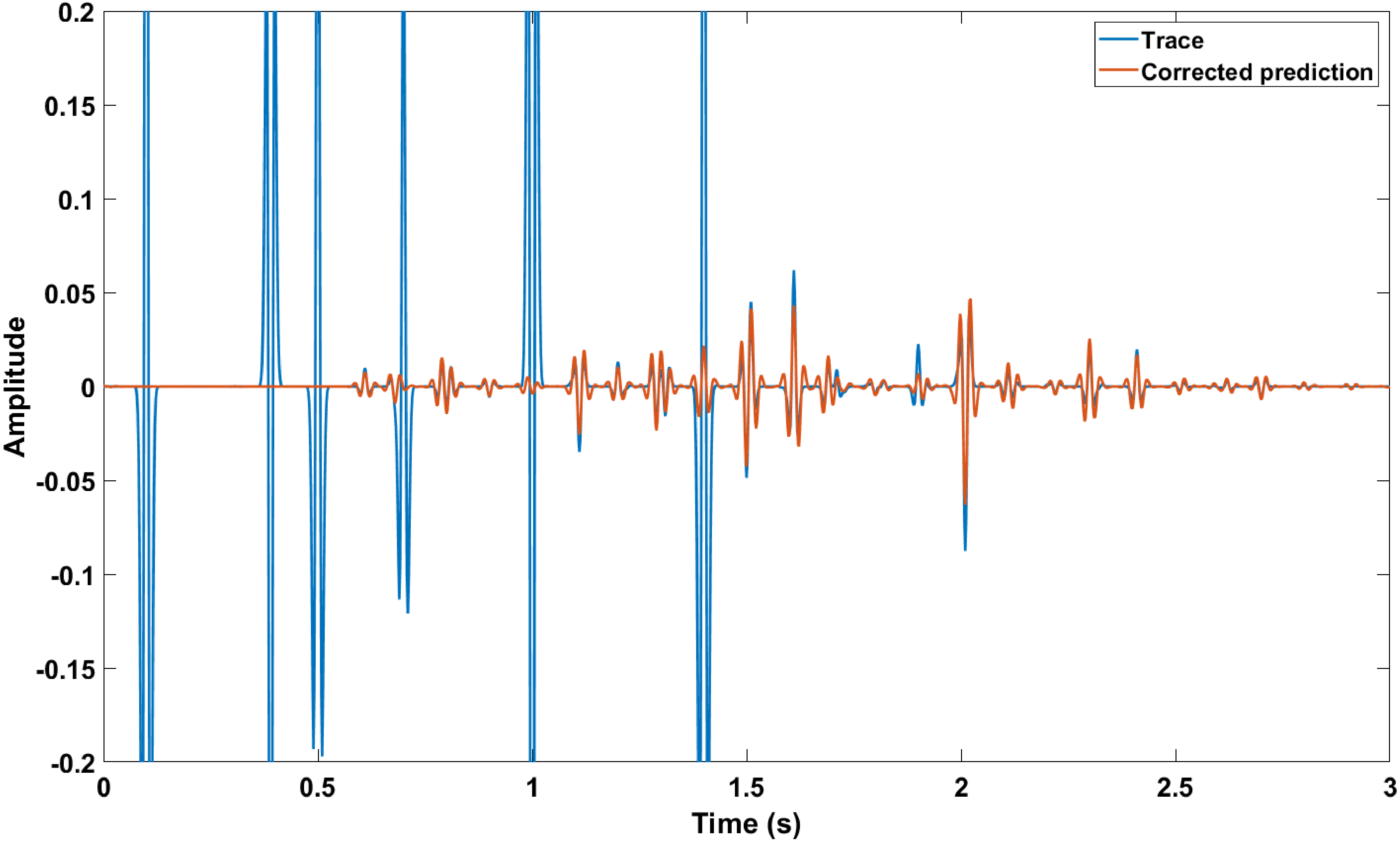


DG-domain adaptive subtraction

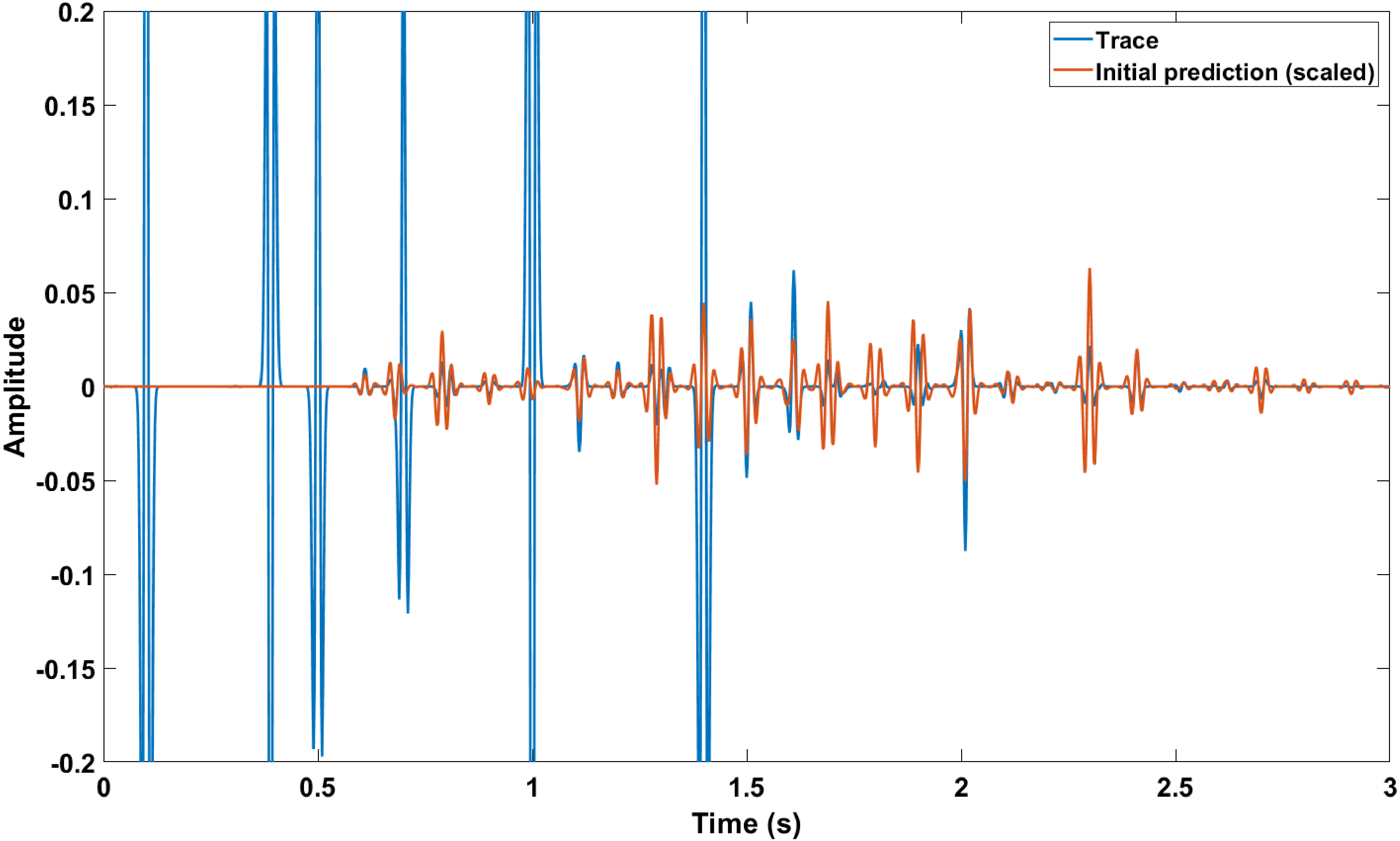


$$f = h(\boldsymbol{t_D})g(\boldsymbol{t_G})$$

Amplitude-corrected DG domain prediction



Conventional prediction



Conclusions

- Transmission related losses aren’t correctly treated in conventional ISSIMP
- This makes effective multiple removal very difficult
- Applying adaptive subtraction in the DG domain allows for better treatment of these losses

Acknowledgements

- CREWES sponsors, staff and students
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CREWES

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